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Abdolhossien Nassehzadeh-Tabrizi

Roland W. Jeppson

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By

Abdolhossien Nassehzadeh-Tabrizi

and

Roland W. Jeppson

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Utah Water Research Laboratory
Utah State University
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NOTATION

AKV	A coefficient of K_v or K_v'
AL	A coefficient of λ or λ'
APB	A coefficient of P_b or P_b'
APOR	A coefficient of η or η'
ASR	A coefficient of S_r or S_r'
a	Soil parameter
BKV	B coefficient of K_v or K_v'
BL	B coefficient of λ or λ'
BPB	B coefficient of P_b or P_b'
BPOR	B coefficient of η or η'
BSR	B coefficient of S_r or S_r'
b	Soil parameter
D	Jacobian matrix
D	Dimensionless depth, or depth/L
F	Function
f	Instantaneous infiltration rate, dimensionless
g	Acceleration due to gravity
H	Horizontal movement of wetting front, dimensionless
h	Hydraulic head or energy per unit weight of fluid being the sum of the elevation and pressure head
h_o	Dimensionless hydraulic head at which the soils exist initially under static equilibrium
h_s	Soil water suction head; $h_s = -P/\rho g$
h_t	Dimensionless hydraulic head, $(h_t = z - P_t)$
I	Dimensionless rate of infiltration
i	Node index in r-direction
j	Node index in z-direction
K	Effective hydraulic conductivity
K	Index of discretized variable denoting time increment
K_a	A constant with units of velocity
K_v	A dimensionless quantity which is a function of depth, z (values of parameter decreasing with depth)
K_v'	A dimensionless quantity which is a function of depth, z (values of parameter increasing with depth)
K_o	Saturated hydraulic conductivity
$K(\theta)$	Hydraulic conductivity, function of water content, θ
K_r	Relative hydraulic conductivity
L	Characteristic length used for nondimensionalization
l	Length of the soil column
m	Iteration index (Newton-Raphson Method)
n	Is a constant between -1 and zero, that depends on the soil and its physical condition
N_r	Number of grid lines from the axis of symmetry to the outside radius of the problem
N_z	Number of grid lines from the surface to the bottom boundary
N2X	Number of points in radial direction to outer edge of circle of application
P	Soil water pressure head
P_b	Dimensionless bubbling pressure head, function of depth, z (values of parameter decreasing with depth)
P_b'	Dimensionless bubbling pressure head, function of depth, z (values of parameter increasing with depth)
P_c	Capillary pressure, in feet
P_t	Dimensionless pressure head or pressure head/L
P_o	Pressure head parameter
P_t'	Dummy variable of integration
P_1	Soil parameter having the same dimensions as P_c
R	Radial coordinate
R2	Correlation coefficient

r Dimensionless radial (horizontal) coordinate, or this coordinate/L

r_a Dimensionless radius of circle of application, or this radius/L

r_f Dimensionless radius of outer boundary of region of interest or this radius/L

S Saturation, or volume of water divided by volume of voids

S_e Effective saturation

S_r Residual saturation as a function of depth, z (values of parameter decreasing with depth)

S_r' Residual saturation as a function of depth, z (values of parameter increasing with depth)

S_s Saturation parameter denoting largest saturation obtained under imbibition

SSUR Specified soil surface saturation

t Time

v Vertical penetration of wetting front, dimensionless

V Seepage velocity (flow rate per unit area)

$\vec{V}$ Seepage velocity vector

V_r Seepage velocity component in the radial direction

V_Φ Seepage velocity component in the tangential direction

VK Dimensionless application rate, $VK = W/K_a$

W Seepage velocity component in the axial direction

W,Y,X Cartesian coordinates

Z,R,Φ Cylindrical coordinates

ϕ Soil parameter, dimensionless

z Dimensionless axial (vertial) coordinate, or the coordinate/L

ξ New dependent variable obtained from Kirchhoff transformation

ξ_0 Initial distribution of ξ

ψ Dependent variable obtained from Kirchhoff transformation for homogeneous soils

β Soil parameter, dimensionless

η Soil porosity, function of depth, z (values of parameter decreasing with depth)

η' Soil porosity, function of depth, z (values of parameter increasing with depth)

τ Dimensionless time

λ Pore size distribution exponent, function of depth, z (values of parameter decreasing with depth)

λ' Pore size distribution exponent, function of depth, z (values of parameter increasing with depth)

λ_0 Is the reference value of pore size distribution exponent at soil surface

ζ Parameter

ρ Density of water

μ Dynamic viscosity of the water

θ Volumetric water content

γ Soil parameter, dimensionless

γ Specific weight of water, $\gamma = \rho g$

ε Soil parameter, dimensionless

Δr Mesh size in the r-direction

Δs Dimensionless space increment, $\Delta s = \Delta z = \Delta r$

Δz Mesh size in the z-direction

$\Delta\tau$ Magnitude of the time step

Δ Difference operator

δ Central difference operator

∂ Partial differentiation operator

INTRODUCTION

During the past decade, knowledge of soil water flow under unsaturated conditions has advanced rapidly as high speed digital computers have made the solution of such initial-boundary-value problems practical. The majority of past solutions to unsaturated problems have been obtained for isothermal flow in isotropic, homogeneous soils. More detailed attention can now be devoted to unsaturated transient flow systems in heterogeneous soils. Steady state flow conditions do not exist except under rare conditions and heterogeneity of the soil is the rule rather than the exception in nature.

Objectives of this study are to develop the solution methodologies for obtaining finite difference solutions to unsteady flows in unsaturated heterogeneous soils utilizing simple parametric equations for defining the soils unsaturated hydraulic properties; i.e. the relationship between the water saturation and capillary pressure and the relationship between the unsaturated hydraulic conductivity and capillary pressure. Based on this numerical solution capability the effect of varying each of the parameters in these relationships is to be defined for the problem of infiltration from a circular surface area. These effects are to be quantified by obtaining a number of solutions and studying the differences in them for such indexes of infiltration as intake capacities, lateral spreading, and depths of penetration.

A previous report, Nassehzadeh-Tabrizi et al. (26) describes meeting these objectives in part. Therein the assumption was made that the effect of each parameter was independent. This is not entirely true. Therefore, in this report the effects vary more than one parameter from numerical solution to the next one studied. For completeness, the numerical solution methodologies are included.

At the present time, the mathematical solutions for transient flow in heterogeneous soils [with the exception of the one by Watson and Whisler (43), in which they allowed the saturated hydraulic conductivity to vary with depth] have assumed that the soil consists of discrete layers of homogeneous soil. Assuming discrete layers is little more than a modification of numerical solution for homogeneous soils in which the hydraulic properties are changed between finite difference grid points while advancing the water through one layer to the next layer of soil. In this approach the hydraulic head and pressure head, but not the moisture content, are assumed continuous across the interface of the two layers. However, the differential form of the continuity equation for soil water flow is based on having all the dependent variables and their derivatives continuous. Only the integral form of the continuity equation is valid. Consequently the approach for handling layered soils is fundamentally invalid.

Nassehzadeh-Tabrizi et al. (26) presented an alternative method that describes soil heterogeneity by specifying that the physical and hydraulic properties of the soil vary continuously as a function of depth. They studied three-dimensional axisymmetric unsaturated transient flow through heterogeneous porous media resulting from water applied at the soil surface. In their solution, heterogeneity is described by specifying that the hydraulic properties of the soil vary continuously with depth. They used the Brooks-Corey parametric equations to describe the hydraulic properties of the soil, primarily because they give reasonably good fit to much capillary pressure-saturation and capillary pressure-hydraulic conductivity data especially if the soil is being desaturated or on the imbibition cycle and not close to unit saturation, and involve only three parameters, the pore size distribution exponent, λ, the bubbling pressure, P_b, and the residual saturation, S_r. Thus the heterogeneity of the soil is described by letting the saturated hydraulic conductivity, K_o, the soil porosity, n, as well as λ, P_b, and S_r be any continuous function of the soil depth. Nassehzadeh-Tabrizi et al. (26) developed coaxial graphs by varying only one of these five soil parameters at a time. Thus, these previous graphs assume that the effect each parameter has on water movement in heterogeneous soils is the same regardless of the magnitude of the other parameters. That is, no interaction between parameters exists. In referring to such a possible interactive effect, or lack of interactive effect, the terminology "parameters act dependently" or "parameters act independently" in influencing infiltration characteristics will be used.

The specific objective, therefore, is to determine whether the parameters "act independently" or "act dependently," and if they act dependently how significant the dependent action is. To accomplish this objective infiltration characteristics resulting with simultaneous variation of parameters will be compared to the corresponding characteristics when only one parameter is varied at a time.

BASIC PAST LITERATURE

In 1856 Darcy (10) observed the characteristics of downward flow of water through saturated sand filters, and published his now famous experimental law. Darcy's law states that the flow of water through a column of saturated soil is directly proportional to the gradient of the potential or head and inversely proportional to the length of the column, or

$$V = -K \frac{\Delta h}{\ell} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad [1]$$

where V is the Darcian velocity, K is the hydraulic conductivity with dimensions of velocity, Δh is $\Delta(P/\rho g + z)$, the difference in hydraulic head, and ℓ is the length of the column.

This basic law of soil water flow was found originally for one-dimensional vertical flow. Later, in 1937 Muskat (25) verified the applicability of Darcy's law in any direction and generalized Darcy's law for saturated flow in three-dimensional space as a vector equation such as:

$$\vec{V} = - K \text{ grad}\cdot h \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad [2]$$

in which $\vec{V}$ is the velocity vector. The negative sign indicates the flow occurs in the direction of decreasing hydraulic head.

The limitations of Darcy's law are:

1. The velocity of flow must be relatively slow in order to neglect inertia forces.
2. There must be no interaction between soil and fluid.
3. The fluid must be homogeneous and incompressible.

Even though Equation 2 was developed for saturated flow in homogeneous porous media, it has application to porous media problems that are partially saturated, which are common in nature. Buckingham (7) visualized that the flow of water in an unsaturated soil is analogous to heat flow and to flow of electricity through a conductor. He introduced the concept of capillary potential to describe attraction of soil for water. Capillary potential is defined as the work required to move a unit weight of water from the reference plane (free water surface as reference) to any point in the soil column. Richards (35) developed the general equation of flow in unsaturated media in which the water content and capillary conductivity are independent functions of the capillary pressure.

Richards (34) assumed that the flow of water in unsaturated porous media obeys Darcy's law. This assumption was proven valid from experimental data by Childs and Collis-George (9) and analytically by Hall (14). In a modified form in which the hydraulic conductivity is a function of the volumetric water content, θ, Darcy's law for the flow of water through unsaturated porous media can be written as follows:

$$\vec{V} = -K(\vec{r},\theta) \text{ grad}\cdot h \quad . \; . \; . \; . \; . \; . \quad [3]$$

in which $\vec{r}$ is the space vector and K is a variable even for homogeneous soil and rapidly becomes smaller as the water content θ decreases.

Darcy's law does not solve directly any particular flow problem in porous media, but when substituted in the continuity equation, it produces the differential equation describing many initial-value boundary-value problems. To obtain a solution to this differential flow equation, it is necessary to have functional relationships between saturation, hydraulic conductivity, and capillary pressure.

Gardner (12) made a survey of proposed equations and from studies of available data concluded that conductivity can be related to the capillary pressure by the following equation:

$$K = \frac{a}{h_s^n + b} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad [4]$$

in which K is the hydraulic conductivity, h_s is the suction head, and a, b, and n are constants depending on the soil, fluid, and capillary pressure history of the system. King (22) noted that Equation 4 is dimensionally inconsistent. He modified Gardner's equation and suggested the following dimensionless equation:

$$K_r = \frac{1}{\left(\frac{P}{P_1}\right)^a + b} \quad . \; . \; . \; . \; . \; . \; . \quad [5]$$

where a and b are positive dimensionless soil parameters, P is the fluid pressure, and P_1 has the same dimensions and sign as P. King (22) also proposed a hyperbolic function for saturation and relative hydraulic conductivity.

$$K_r = \sigma \left[\frac{\cosh (P/P_2)^{\phi} - 1}{\cosh (P/P_2)^{\phi} + 1} \right] \quad . \; . \; . \quad [6]$$

and

$$S = \delta - \left[\frac{\{\cosh (P/P_0)^\beta + \varepsilon\} - \gamma}{\{\cosh (P/P_0)^\beta + \varepsilon\} + \gamma} \right] \quad [7]$$

in which P_2 has the dimensions of P ($P_2 > 0$), S is the saturation, P_0 has the dimensions of P ($P_0 > 0$) $\phi < o$, $o < \sigma < 1$, $\beta < o$, $o < \gamma \leq \cosh \varepsilon$, $o < \delta \leq 1$ all are dimensionless parameters. King then ran comparison tests of the modified Gardner's equation (Equations 5 and 6) with laboratory data. The results showed that both equations gave a good fit to imbibition as well as to drainage data and both describe a continuous function that plateaued on the log-log graph of relative hydraulic conductivity, K_r, versus log capillary pressure P_c near the values of $K_r = 1$. This is in contrast to Brooks-Corey equations which is discontinuous at $P_c \leq P_b$ and defines relative hydraulic conductivity as:

$$K_r = \left(\frac{P_b}{P_c} \right)^\lambda \quad . . . . [8]$$

for

$$|P_c| \geq |P_b| \quad . . . . [9]$$

and

$$K_r = 1 \quad . . . . [10]$$

for

$$|P_c| < |P_b| \quad . . . . [11]$$

The theory developed by Burdine (8) utilizes a saturation-capillary pressure relation to determine the corresponding saturation-hydraulic conductivity relation. The modified Burdine equation for relative hydraulic conductivity in a simple form is given by:

$$K_r = S_e^2 \frac{\int_0^S \frac{dS}{P_c^2}}{\int_0^1 \frac{dS}{P_c^2}} \quad . . . . . . [12]$$

in which P_c is the capillary pressure, and S_e is the effective saturation defined by $S_e = (S-S_r)/(1-S_r)$, S_r is the residual saturation. Hydraulic conductivities computed by numerical integration of the Burdine equation (12) show good agreement with hydraulic conductivities obtained from equations developed by Millington and Quirk (23,24) especially under desaturation conditions. To handle imbibitions, Jeppson (21) includes a pressure head parameter, P_0 with the capillary pressure P_c to prevent division by zero as the soil becomes fully saturated where $P_c = 0$, and replaces the 1 in the upper limit of the integration by a saturation parameter, S_s, and begins the integration at S_r.

$$K_r = S_e^2 \frac{\int_{S_r}^{S} \frac{dS}{(P_c + P_0)^2}}{\int_{S_r}^{S_s} \frac{dS}{(P_c + P_0)^2}} \quad . . . . [13]$$

Brooks and Corey (4) carried out laboratory desaturation experiments on homogeneous and isotropic samples where air and water were nonwetting and wetting fluids, respectively. They found the experimental data of effective saturation, S_e, as a function of the ratio of capillary pressure to bubbling pressure plots close to a straight line on log-log graph paper for capillary pressure P_c greater than the bubbling pressure P_b (Figure 1). Brooks and Corey suggested the following empirical relationship:

$$S_e = \left(\frac{P_b}{P_c} \right)^\lambda, \quad \text{for} \quad |P_c| \geq |P_b| \quad [14]$$

$$S_e = 1, \quad \text{for} \quad |P_c| < |P_b| \quad [15]$$

in which λ is the negative of the slope of the plot on log-log graph paper and is defined as the pore size distribution exponent.

Brooks and Corey (5) used Burdine equation (12) to derive the following equation for relative hydraulic conductivity and capillary pressure

$$K_r = \left(\frac{P_b}{P_c} \right)^{2+3\lambda} \quad . . . . . . [16]$$

Application of the Brooks-Corey equations is limited to:

1. Isotropic porous media.

2. Relative hydraulic conductivities, $K_r = 1$ for $|P_c| < |P_b|$.

3. Conditions for which $S > S_r$, and even they are inaccurate at saturation slightly greater than S_r.

The partial differential equation which describes water movement through the soils can be derived by substituting Darcy's law into the differential form of the continuity of mass equation. The governing equation for unsaturated flow is nonlinear and boundary conditions are complicated. Exact analytical solutions of the partial differential equation governing the flow of water through the porous media are not available, except for over simplified cases.

Scott and Hanks (39) solved the one-dimensional water movement equation using a power series. They assumed in one case that the diffusivity is an exponential function of water content, an approach which

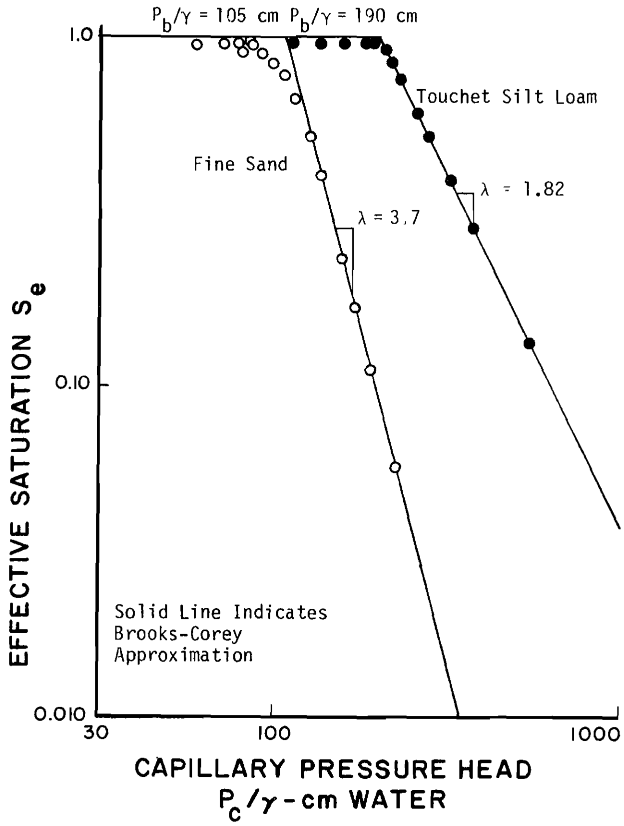

Figure 1. Relation between effective saturation and capillary pressure head (5).

was used extensively by Gardner and Mayhugh (13) and assumed a linear function of water content in another case. Also they assumed that diffusivity and capillary tension are single-valued functions of water content. They noted that if numerical solutions compared favorably with available analytical solutions for simple cases for which the latter are possible one might expect that numerical solutions would apply for more complicated problems.

Wooding (44) assumed that the hydraulic conductivity of an unsaturated soil is an exponential function of the pressure head. He used the method of linearization proposed by Philip (29,30,31) and reduced the nonlinear differential equation to a linear type and solved the problem of steady infiltration from a shallow, circular flooded area on a horizontal surface of a semi-infinite porous media, and showed the variation of soil moisture movement in a radial direction for different types of soils. Philip (31) assuming the hydraulic conductivity is an exponential function of moisture potential, applied Kirchhoff's transformation to linearize the nonlinear equation of steady flow, and obtained solutions for steady infiltration from a buried point source and spherical cavities. He stated for a small radius of spherical cavity the capillary effect dominates, but gravitation force becomes more important when the radius increases. Philip (32) analyzed steady two- and three-dimensional infiltration in heterogeneous soils. He assumed that the hydraulic conductivity depends exponentially on both moisture content and depth, and applied Kirchhoff's transformation to linearize the nonlinear flow equation.

Raats (33) upon assuming that the hydraulic conductivity is an exponential function of pressure head, linearized the steady nonlinear axisymmetric flow equation by using matrix flux potential (Kirchhoff's transformation). He analyzed steady infiltration from buried point sources and surface point sources, and obtained explicit equations for the pressure head, total head and matrix flux potential, and the Stoke's stream function.

With the development of high speed digital computers, more complex problems were solved numerically. Freeze (11) reviewed the available literature of one-dimensional, vertical, unsaturated unsteady flow problems in soils studied by a number of researchers, and Remson, Hornberger and Molz (34) gave an outline of published numerical solutions mostly applied to porous media flow.

Hanks and Bowers (15) in their pioneering work presented a method to solve the water flow equation for vertical infiltration in layered (heterogeneous) soils. They defined a variable time increment, Δt, as the time required for a constant amount of water to enter the soil profile. Since the infiltration rate of the soil decreases with time, the calculated time increment will be smaller at the beginning of infiltration computation relative to its value at later stages. They plotted the distribution of the pressure head and water content versus depth for layered soils (coarse soils overlaying a fine soil and vice versa). They noticed that for water content, there is a discontinuity at the boundary between the two layers, however, pressure distribution along the profile was continuous for all cases of heterogeneity. There was excellent agreement between the Hanks and Bowers numerical model and theoretical solution presented by Scott et al. (40) and Philip (28) for horizontal infiltration through a horizontal layer of soil at uniform initial water content.

Jeppson (17) numerically solved the partial differential equation which describes three-dimensional (axisymmetric) unsaturated flow in the soil below infiltrometers to determine the influence of soil properties, rate of application, and initial hydraulic head on subsurface flow patterns (penetration and lateral movement of the wetting front). He noticed that whenever a portion of flow field reaches to high values of relative saturation approximately 0.90, depending on the hydraulic properties of the soil, numerical difficulties occur in the solution process unless the time increment, $\Delta\tau$, is decreased sufficiently. He suggested that the solution capability can be improved by transforming the dependent variable (hydraulic head) in flow equation to a new variable ξ by means of the Kirchhoff transformation. This latter technique has been widely used by many researchers (2, 31, 33, 41, 42, 44).

The goal of this transformation is to linearize (under some conditions) and make the equation of flow more amenable to analytical solution methods.

Jeppson (18) reported that for problems in which a portion of flow region approaches unit saturation, the use of the Kirchhoff transformation in formulation of the mathematical problem of partially saturated transient flow from an infiltrometer improved the solution capabilities.

Brandt et al. (2) developed two mathematical models (a plane flow model and a cylindrical model) to analyze multi-dimensional, unsteady infiltration from a trickle source into homogeneous soils. In the case of the cylindrical model (axisymmetric) the emitters were placed far enough apart to prevent interaction between emitters. Upon applying the Kirchhoff transformation, they introduced a new function of water content. They compared the numerical results with Wooding's solution for steady state infiltration from a circular pond for different values of time to show how the unsteady flow approaches steady state flow. For verification of this model, Bresler et al. (3) conducted laboratory experiments. They compared the location of wetting front and water content distribution in both numerical solution and by experiment. They concluded the agreement between theory and experiment was good and that application of the theory to the field is justified.

Watson and Whisler (43) studied the gravity drainage of a heterogeneous porous media. They defined the heterogeneity of porous media in terms of a linear variation of the saturated hydraulic conductivity with depth. They allowed the hydraulic conductivity to decrease with depth and obtained hydraulic head and water content profiles with depth. They reported that by applying one of the available experimental methods for determining saturated hydraulic conductivity in the field at different depths, it is possible to check the homogeneity of the profile.

Jeppson (19) studied different numerical techniques for solution of transient, three-dimensional (axisymmetric), unsaturated moisture movement through homogeneous soil resulting from infiltration over a horizontal circular surface area. To minimize the difficulties due to the strong nonlinearities of the flow equation, he compared the three adaptations of Crank-Nicolson method and three variations of the alternating direction implicit (ADI) method. Since no constraints have been seen in applying Crank-Nicolson method, he favored this method. In another effort Jeppson (20) used the previous model (Jeppson, 19) and compiled a series solution for different problem specification such as size of the circle of application and for different parameters describing the hydraulic properties of unsaturated soils. He stated that greater understanding of the infiltration process can result when one problem specification is incremented over a range of possible situations. Samadi (37) used Jeppson's (16) computer one-dimensional program to evaluate the effect of interaction between the soil parameters used to describe heterogeneity. He concluded that there is a minor to insignificant effect on infiltration due to interaction between the soil parameters. Based on the results of study, the additive law of effect can be applied in using the results.

Definition of the Physical Problem

The particular problem which is described herein is that of unsteady, unsaturated, three-dimensional but axisymmetric infiltration through heterogeneous soil from a circular horizontal surface area. The circular area over which the water enters the soil is small compared with the total soil surface. Therefore, three-dimensional axisymmetric unsteady-unsaturated infiltration of water occurs. The wet regions of seepage below the water entry zone are symmetric about the vertical centerline. Therefore, the boundary value problem can be formulated for one half of any vertical plane containing the axis of symmetry. Figure 2 shows the physical problem and typical assumed boundaries of the flow field. The soil is treated as a heterogeneous medium by letting the saturated hydraulic conductivity, K_o, the soil porosity, η, residual saturation, S_r, pore size distribution exponent, λ, and bubbling pressure, P_b, be any continuous functions of the vertical coordinate. The effect of evaporation from the soil surface is neglected.

The mathematical model consists of the partial differential equations of flow through porous media which provide the basis for specification of the functioning system, together with the boundary and initial conditions. Assumptions are also made in the mathematical formulation and in analyzing the problem.

Assumptions in the Mathematical Formulation

The following assumptions are included in the definition of the flow equation:

1. Darcy's law is valid for unsaturated flow.

2. The water is incompressible (ρ = constant).

3. The porous medium is stable (exhibits no swelling, shrinkage or consolidation, η = constant at any depth with time, but may be variable with depth).

4. Only the liquid phase of water is considered. Water vapor flow is neglected (vapor flow is small compared with the liquid flow).

5. No osmotic potentials affect the flow.

6. The flow is assumed to be isothermal.

7. The condition of flow is not affected by the biological process (uptake by plant, or biological action that may change the conductivity with time, etc.).

8. There is no interaction between soil and water.

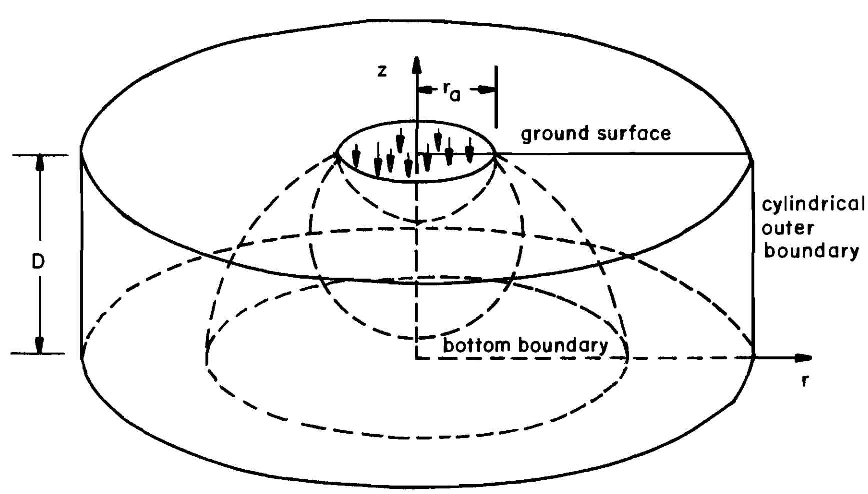

Figure 2. Physical conditions representing three-dimensional axisymmetric transient unsaturated flow through heterogeneous media from a circular application area.

9. The functions which describe the flow and their derivatives are assumed to be continuous, so that the differential form of the continuity equation is valid.

10. Air in the unsaturated parts of the system is assumed to be at atmospheric pressure, and there is no entrapped air in the system.

11. Since only the imbibition cycle is considered, it is assumed that the capillary pressure and hydraulic conductivity of the porous medium are single-valued, unique and continuous with soil water content (no hysteresis).

12. The soil is assumed to be isotropic.

Formulation of the Mathematical Model

Although many mathematical expressions have been used to describe relationships between capillary pressure, saturation and hydraulic conductivity in modeling unsaturated flow problems, in this study the Brooks-Corey parametric equations (14 and 16) have been used. Brooks-Corey equations are relatively simple (involve only three parameters, S_r, λ, and P_b) and also provide a reasonably good fit to capillary pressure-saturation and capillary pressure-hydraulic conductivity data when on the desaturation cycle but also on the imbibition cycle if unit saturations are not approached.

The General Flow Equation

Using the above description of heterogeneity, the Brooks-Corey equations for saturation and relative hydraulic conductivity become:

$$S = S_r(z) + [1 - S_r(z)] \left[\frac{P_b(z)}{P_t(r,z)} \right]^{\lambda(z)} \quad \ldots \ldots \ldots \ldots \ [17]$$

and

$$K_r = \left[\frac{P_b(z)}{P_t(r,z)} \right]^{2+3\lambda(z)} \quad \ldots \ldots \ [18]$$

in which S is the saturation and varies as a function of depth, radial position and time, τ; S_r is the residual saturation and is a given function of depth; P_b is a positive dimensionless bubbling pressure head obtained by dividing the magnitude of the bubbling pressure head by a characteristic length, L, and is a given function of depth; P_t equals $-P_c/\gamma L$, and is the dimensionless pressure head, and varies as a function of r, z, and τ; r equals R/L and is the dimensionless radial coordinate; z equals Z/L and is the dimensionless axial coordinate; λ equals pore size distribution exponent and is a given function of depth; L equals a scaling length used to nondimensionalize the radial and axial coordinates and pressure heads; K_r equals K/K_o and is the relative hydraulic conductivity at each position in which K is the effective hydraulic conductivity and K_o is the saturated hydraulic conductivity, and is a given function of z. In defining the saturated hydraulic conductivity, K_o, the product of a constant K_a, with units of velocity, and a dimensionless quantity which is a given function of the depth K_v is used, i.e.,

$$K_o(z) = K_a \, K_v \, (z) \quad \ldots \ldots \ldots \ [19]$$

where for the soil surface, the value of constant K_a will be taken equal to the saturated hydraulic conductivity on the surface; therefore $K_v(z) = 1.0$ on the soil surface. Thus effective hydraulic conductivity is defined as

$$K = K_o(z) \, K_r \quad \ldots \ldots \ldots \ldots \ [20]$$

or

$$K = K_a \, K_v \, (z) \, K_r \, (P_b, \lambda, P_t) \quad \ldots \ [21]$$

For three-dimensional axisymmetric seepage flow through a porous medium, Darcy's law gives the velocity component in the radial, r, and axial, z, coordinate directions, respectively by:

$$V_r = - K \frac{\partial h_t}{\partial r} = - K \left(\frac{\partial (z - P_t)}{\partial r} \right) = K \frac{\partial P_t}{\partial r} \quad [22]$$

$$W = - K \frac{\partial h_t}{\partial z} = - K \frac{\partial (z - P_t)}{\partial z} = K \left(\frac{\partial P_t}{\partial z} - 1 \right) \quad \ldots \ldots \ldots \ldots \ [23]$$

in which

$$h_t = \frac{h}{\gamma L} \quad \ldots \ldots \ldots \ldots \ [24]$$

$$h = Z + P_c \quad \ldots \ldots \ldots \ldots \ [25]$$

$$z = \frac{Z}{L} \quad \ldots \ldots \ldots \ldots \ [26]$$

$$r = \frac{R}{L} \quad \ldots \ldots \ldots \ldots \ [27]$$

$$P_t = \frac{-P_c}{\gamma L} \quad \ldots \ldots \ldots \ldots \ [28]$$

$$h_t = z - P_t \quad \ldots \ldots \ldots \ldots \ [29]$$

in which K(r,z,p) is the hydraulic conductivity of the soil with dimension of velocity, and h is the potential energy per unit weight of water with dimension of length as the sum of elevation head Z and pressure head P_c.

The pressure head is given by

$$P_c = \frac{P}{\rho g} = \frac{P}{\gamma} \quad \ldots \ldots \ldots \ [30]$$

in which P is the pressure of water and is positive for saturated zones and negative for partially saturated zones, g is the acceleration of gravity and ρ is the fluid density. The dimensionless time parameter and continuity equation in cylindrical coordinates are given by, respectively

$$\tau = \frac{K_a}{L} t \quad . . . . [31]$$

and

$$\frac{\partial w}{\partial Z} + \frac{V_r}{R} + \frac{\partial V_r}{\partial R} = - \eta \frac{\partial S}{\partial t} \quad . . [32]$$

Substituting seepage velocity components in the equation of continuity in cylindrical coordinates, and considering the definition of hydraulic conductivity in this study, making algebraic simplification, the general dimensionless form of the flow equation in porous media becomes:

$$K_v \frac{\partial^2 P_t}{\partial r^2} - \frac{2+3\lambda}{P_t} K_v \left(\frac{\partial P_t}{\partial r} \right)^2 + K_v \frac{\partial^2 P_t}{\partial z^2} + \left(\frac{\partial P_t}{\partial z} - 1 \right)$$

$$\left[K_v \left(\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} + 3 \ln \left(\frac{P_b}{P_t}\right) \frac{\partial \lambda}{\partial z} - \frac{2+3\lambda}{P_t} \frac{\partial P_t}{\partial z} \right) + \frac{\partial K_v}{\partial z}\right]$$

$$+ \frac{K_v}{r} \frac{\partial P_t}{\partial r} = \left(\frac{\eta\lambda(1-S_r)}{P_t K_r} \right) \left(\frac{P_b}{P_t} \right)^{\lambda} \frac{\partial P_t}{\partial \tau} \quad . . . . [33]$$

Equation 33 is a nonlinear parabolic partial differential equation. For the initially unsaturated soils the flow equation will remain parabolic at all times, since saturation occurs at most only at the surface of water application.

The initial boundary value problem associated with Equation 33 will be solved by finite difference methods. Whenever there is an abrupt wetting front such a numerical solution is less accurate than desirable. Across the wetting front, the change is too rapid for the second degree polynomial used in the finite differences equations to accurately represent the dependent variable. Therefore, the continuous variables P_t or h_t are not well adapted as dependent variables, a condition which is aggravated by the strongly nonlinear nature of the partial differential equation. Jeppson (18) indicated that a more straightforward approach is to introduce a new dependent variable by means of a Kirchhoff transformation (Ames, 1), that changes by a relative small amount at higher capillary pressure in comparison to its magnitude changes at low capillary pressure. This modification is necessary since across the wetting front the capillary pressure varies rapidly in space as well as possibly time. The introduced dependent variable obtained by applying the Kirchhoff transformation varies more smoothly across the wetting front than capillary pressure head, P_t, or the hydraulic head, h_t.

The Kirchhoff transformation is:

$$\psi = \int_1^{P_t} K_r \, d P_t' \quad . . . . . . [34]$$

in which P_t' is a dimensionless dummy variable of integration. The integration of Equation 34 is not possible for heterogeneous soils, because λ is a function of depth. For the integration it is necessary to define a specific variation of λ for a given problem.

The Brooks-Corey equation can be written as:

$$K_r = \left(\frac{P_h}{P_t}\right)^{2+3\lambda} \quad . . . . [35]$$

and define P_e as

$$P_e = \left(\frac{P_b}{L}\right)^{2+3\lambda} . . . . [36]$$

$$K_r = P_e \, P_t^{-(2+3\lambda)} \quad . . . . [37]$$

and integration of Equation 34 in the case of homogeneous soil produces

$$\psi = \frac{1 - P_t^{-(1+3\lambda)}}{(1 + 3 \lambda)} \quad . . . . [38]$$

For the integration of Equation 34 it is not desirable to have it be restricted to a functional variation of $\lambda(z)$, that allows it to be integrated. An alternative which introduces a new dependent variable ξ is defined by the equation

$$\xi = \frac{1 - P_t^{-(1+3\lambda_o)}}{1 + 3 \lambda_o} \quad . . . . . . [39]$$

$$\zeta = [1 - (1+3\lambda_o)\xi] \quad . . . . [40]$$

$$P_t = [1 - (1+3\lambda_o)\xi]^{-\frac{1}{(1+3\lambda_o)}} = \zeta^{-\frac{1}{(1+3\lambda_o)}} \quad . . . . [41]$$

where λ_o is a reference value of $\lambda(z)$ (values of λ at soil surface where z = D) Equation 38 is the same as Equation 39 only the λ and ψ are replaced with λ_o and ξ.

The new variable ξ has the desirable characteristics that it changes much less abruptly across the wetting front.

Substituting appropriate values of derivatives in Equation 33 the more general equation of three-dimensional transient flow of water through unsaturated, heterogeneous media will result in Equation 42.

$$F = K_v \{ \frac{P_t}{\zeta} [\frac{\partial^2 \xi}{\partial r^2} + \frac{\partial^2 \xi}{\partial z^2} + \frac{2+3\lambda_o}{\zeta} ((\frac{\partial \xi}{\partial r})^2 + (\frac{\partial \xi}{\partial z})^2)]$$

$$- \frac{(2+3\lambda)\ P_t}{\zeta^2} (\frac{\partial \xi}{\partial r})^2 \qquad + (\frac{P_t}{\zeta} \frac{\partial \xi}{\partial z} - 1)$$

$$[\frac{(2+3\lambda)}{P_b} \frac{\partial P_b}{\partial z} + 3 \ln (\frac{P_b}{P_t}) (\frac{\partial \lambda}{\partial z}) - \frac{(2+3\lambda)}{\zeta} \frac{\partial \xi}{\partial z}]$$

$$+ \frac{P_t}{r\zeta} \frac{\partial \xi}{\partial r} \} + (\frac{P_t}{\zeta} \frac{\partial \xi}{\partial z} - 1) \frac{\partial K_v}{\partial z}$$

$$- \frac{\eta\lambda(1 - S_r)}{P_b^{(2+2\lambda)}} \cdot \frac{P_t^{2+2\lambda}}{\zeta} \cdot \frac{\partial \xi}{\partial \tau} = 0 \quad . \quad . \quad [42]$$

INITIAL AND BOUNDARY CONDITIONS

Initial Conditions

Initial conditions must be specified for transient problems including the distributon of the hydraulic head or moisture content throughout the region of flow prior to infiltration. To start the solution it is assumed that prior to infiltration the movement of water is negligible everywhere in the soil and that static equilibrium exists which causes the hydraulic head to be constant throughout the flow field, or the capillary pressure (pressure head) to vary linearly with depth of the soil profile. The water content of the soil profile increases (capillary pressure becomes less in absolute magnitude) with depth below the soil surface, giving

$$P_t = z - h_t \quad \ldots\ldots\ldots\ldots [43]$$

and

$$\xi = \frac{1 - (z-h_t)^{-(1+3\lambda_0)}}{(1+3\lambda_0)} \quad \ldots\ldots [44]$$

Boundary Conditions

The boundary conditions must be defined to duplicate physical conditions. The rectangular region in Figure 3 represents one-half plane containing the axis of symmetry and gives mathematical expressions for the boundaries enclosing the region.

Axis of Symmetry ① - ②

The flow region below the circular water entry zone ② - ③ is symmetric about this boundary. For the homogeneous soils boundary ① - ② is a streamline and all constant head lines (equipotential) are perpendicular to the axis of symmetry. The boundary condition along the center line is:

$$\frac{\partial P_t}{\partial r} = 0 \quad \ldots\ldots\ldots\ldots [45]$$

or

$$\frac{\partial \xi}{\partial r} = 0 \quad \ldots\ldots\ldots\ldots [46]$$

Surface of Water Application ② - ③

The surface over which the water is applied or water entry zone is assumed to be horizontal at a finite height above the drained layer. One of the two conditions may be selected for boundary ② - ③.

a. The flux rate is specified. This condition applies when the intake capacity of the soil is assumed to be greater than the water application rate. Consequently no portion of the seepage zone will be fully saturated.

The specified rate of flux can be a function of time (rain histogram). All streamlines leave the surface of water application vertically. The boundary conditions for the water entry zone are:

$$\frac{\partial \xi}{\partial r} = 0 \quad \ldots\ldots\ldots\ldots [47]$$

for

$$z = D \quad \ldots\ldots\ldots\ldots [48]$$

and

$$0 \le r \le r_a \quad \ldots\ldots\ldots\ldots [49]$$

or

$$\frac{\partial \xi}{\partial z} = \frac{[1 - (1+3\lambda_0)\xi]}{P_t}\left[\frac{W}{K} + 1\right] \quad [50]$$

in which $K = K_a\, K_v\, (z)\, K_r\, (P_b,\, \lambda,\, P_t)$

$$\ldots\ldots\ldots\ldots [51]$$

b. Surface saturation specified (Dirichlet boundary condition). If the saturation at the circular water entry zone is specified, the values of pressure head or hydraulic head will be determined directly for this boundary. When the soil is completely saturated, the capillary pressure is equal to the bubbling pressure ($P_t = P_b$), and the rate of water application is equal to the intake capacity of the saturated soil. The specified saturation can be a function of time and boundary conditions as:

$$P_t = \frac{P_b}{\left(\frac{S-S_r}{1-S_r}\right)^{\frac{1}{\lambda}}} \quad \ldots\ldots\ldots\ldots [52]$$

or

$$\xi = \frac{1 - P_t^{-(1+3\lambda_0)}}{1 + 3\lambda_0} \quad \ldots\ldots\ldots [53]$$

Surface Beyond Radius of Water Application ③ - ④

This surface is at a constant height, D, above drained layer, is horizontal, and no evaporation occurs from it. The boundary condition is the same as

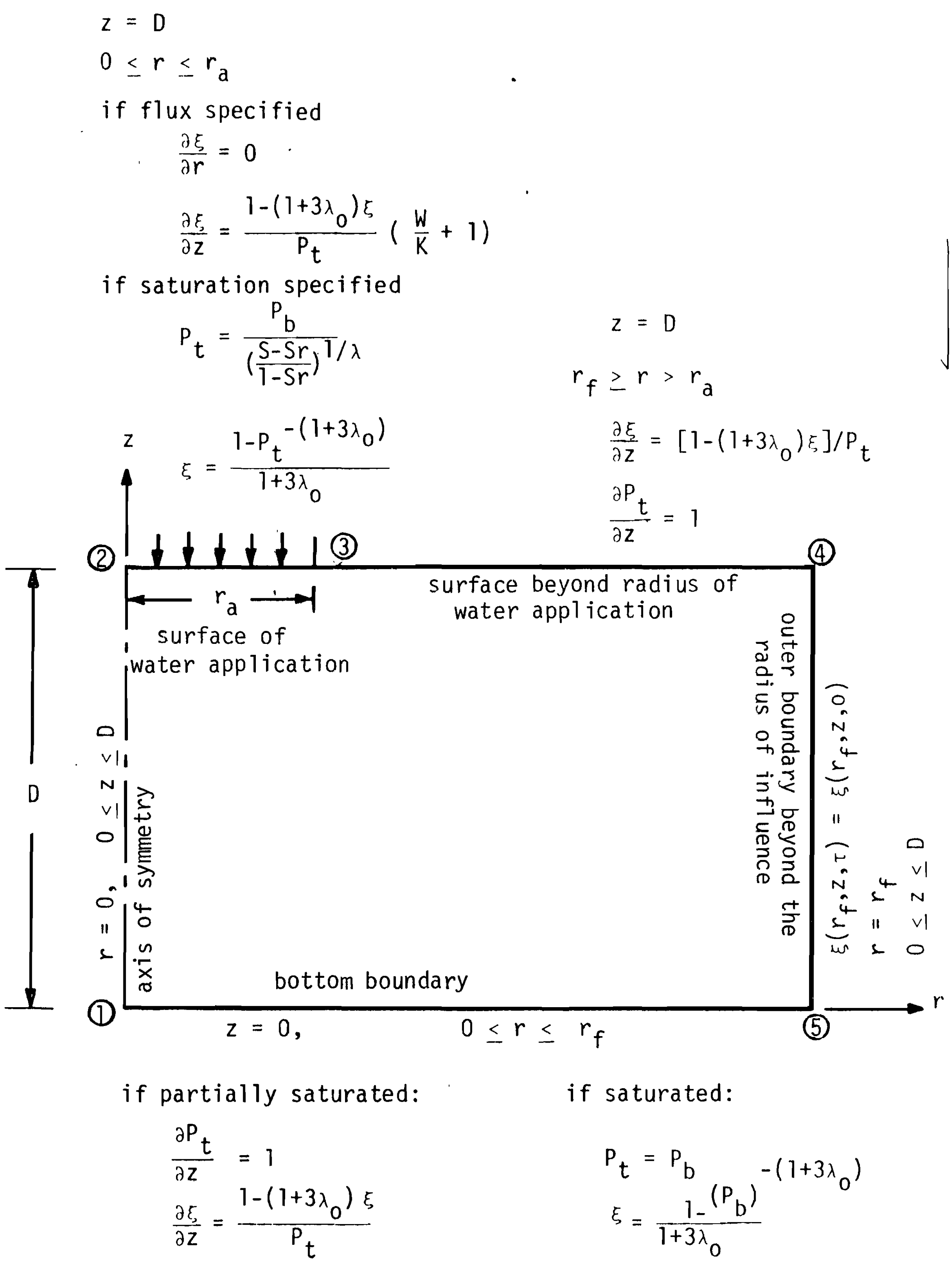

Figure 3. Formulation of the boundary value problem for the transient unsaturated three-dimensional axisymmetric flow from a circular area through heterogeneous porous media.

the boundary ② - ③ except that there is no vertical flux rate W = 0. The boundary conditions are as:

$$r_a \le r \le r_f \qquad \text{. . . . . [54]}$$

$$z = D \qquad \text{. . . . . [55]}$$

$$\frac{\partial \xi}{\partial z} = \frac{[1 - (1+3\lambda_o)\xi]}{P_o} \qquad \text{. . . . [56]}$$

$$\frac{\partial P_t}{\partial z} = 1 \qquad \text{. . . . . [57]}$$

Outer Boundary Beyond the Radius of Influence ④ - ⑤

The outer boundary is assumed far enough removed from the water source that no moisture movement will occur across this boundary and at all times it is in a static equilibrium condition. It is a Dirichlet type boundary and boundary values need not be evaluated in the solution of the problem. The condition is:

$$r = r_f \qquad \text{. . . . . [58]}$$

$$0 \le z \le D \qquad \text{. . . . . [59]}$$

$$h_o = h \qquad \text{. . . . . [60]}$$

$$\xi(r_f, z, \tau) = \xi(r_f, z, 0) \qquad \text{. . . . [61]}$$

in which r_f is beyond the radius of influence and h_o is the initial hydraulic head.

Bottom Boundary ⑤ - ①

A horizontal lower boundary at depth z = 0 is assumed to exist. Water will pass through this lower boundary after the soil at the bottom of the profile becomes saturated.

It is assumed that the surface of the bottom boundary is at a constant pressure. When the unit or maximum saturation is attained at this boundary, water will begin to pass through the boundary. The boundary conditions are:

$$z = 0 \qquad \text{. . . . . [62]}$$

$$0 \le r \le r_f \qquad \text{. . . . . [63]}$$

when the soil profile is not fully saturated

$$\frac{\partial P_t}{\partial z} = 1 \qquad \text{. . . . . [64]}$$

$$\frac{\partial \xi}{\partial z} = \frac{1 - (1 + 3\lambda_o)\xi}{P_t} \qquad \text{. . . . [65]}$$

and when unit saturation occurs

$$P_t = P_b \qquad \text{. . . . . [66]}$$

$$\xi = \frac{1 - (P_b)^{-(1 + 3\lambda_o)}}{1 + 3\lambda_o} \qquad \text{. . . . [67]}$$

FINITE DIFFERENCE SOLUTION

For this study the Crank-Nicolson method of differencing was chosen. The Crank-Nicolson method provides a second order approximation in space and time resulting in a truncation error of $O[(\Delta t)^3 + (\Delta z)^3 + (\Delta r)^3]$. Also the system of difference equations produced by the Crank-Nicolson method retains the computationally advantageous tridiagonal form if iterative line methods are used for their solution as do fully implicit difference schemes. It is unconditionally stable for all values of ratio $\Delta t/(\Delta x)^2$, also.

Finite Difference Operators for Interior Grid Points

The finite difference operator for Equation 42 can be obtained by replacing the derivatives by the first and second order central differences. If the δ's and δ^2's denote first and second central difference operators, we have:

$$2\Delta z \frac{\partial \xi}{\partial z} \simeq \delta_z \xi = \xi_{j-1,i} - \xi_{j+1,i} \quad \ldots\ldots [68]$$

$$2\Delta r \frac{\partial \xi}{\partial r} \simeq \delta_r \xi = \xi_{j,i+1} - \xi_{j,i-1} \quad \ldots\ldots [69]$$

$$\Delta z^2 \frac{\partial^2 \xi}{\partial z^2} \simeq \delta_z^2 \xi = \xi_{j+1,i} + \xi_{j-1,i} - 2\,\xi_{j,i} \quad \ldots [70]$$

$$\Delta r^2 \frac{\partial^2 \xi}{\partial r^2} \simeq \delta_r^2 \xi = \xi_{j,i+1} + \xi_{j,i-1} - 2\xi_{j,i} \quad \ldots [71]$$

and therefore,

$$-(1+3\lambda_0)\frac{\partial P_t}{\partial z} \simeq \frac{P_t}{\zeta}\frac{\delta_z \xi}{2\Delta z} = \frac{P_t}{\zeta}\frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2\Delta z} \quad \ldots [72]$$

$$-(1+3\lambda_0)\frac{\partial P_t}{\partial r} \simeq \frac{P_t}{\zeta}\frac{\delta_r \xi}{2\Delta r} = \frac{P_t}{\zeta}\frac{(\xi_{j,i+1} - \xi_{i,i-1})}{2\Delta r} \quad \ldots [73]$$

$$\frac{\partial^2 P_t}{\partial z^2} \simeq \frac{P_t}{\zeta}\left[\frac{\delta_z^2 \xi}{\Delta z^2} + \frac{(2+3\lambda_0)}{\zeta}\frac{(\delta_z \xi)^2}{4\Delta z^2}\right]$$

$$= \frac{P_t}{\zeta}\left[\frac{(\xi_{j+1,i} + \xi_{j-1,i} - 2\xi_{j,i})}{\Delta z^2} + \frac{(2+3\lambda_0)}{\zeta}\frac{(\xi_{j-1,i} - \xi_{j+1,i})^2}{4\Delta z^2}\right] \quad \ldots\ldots [74]$$

$$\frac{\partial^2 P_t}{\partial r^2} \simeq \frac{P_t}{\zeta}\left[\frac{\delta^2 r}{\Delta r^2} + \frac{(2+3\lambda_0)}{\zeta}\frac{(\delta_r \xi)^2}{4\Delta r^2}\right]$$

$$= \frac{P_t}{\zeta}\left[\frac{(\xi_{j,i+1} + \xi_{j,i-1} - 2\xi_{j,i})}{\Delta r^2} + \frac{(2+3\lambda_0)}{\zeta}\frac{(\xi_{j,i+1} - \xi_{j,i-1})^2}{4\Delta r^2}\right] \quad \ldots\ldots [75]$$

Replacing the derivative by the equivalent finite difference operators in Equation 42

$$F = \left[K_v \left\{ \frac{P_t}{\zeta}\left[\frac{\delta_r^2 \xi}{\Delta r^2} + \frac{\delta_z^2 \xi}{\Delta z^2} + \frac{2+3\lambda_0}{\zeta}\left(\frac{\delta_r \xi^2}{4\Delta r^2} + \frac{\delta_z \xi^2}{4\Delta z^2}\right)\right]\right.\right.$$

$$- \frac{(2+3\lambda)\,P_t}{\zeta^2}\frac{\delta_r \xi^2}{4\Delta r^2} + \left(\frac{P_t}{\zeta}\frac{\delta_z \xi}{2\Delta z} - 1\right)$$

$$\left(\frac{2+3\lambda}{P_b}\frac{\partial P_b}{\partial z} + 3\ln\left(\frac{P_b}{P_t}\right)\frac{\partial \lambda}{\partial z} - \frac{2+3\lambda}{\zeta}\frac{\delta_z \xi}{2\Delta z}\right)$$

$$\left.\left. + \frac{P_t}{r\zeta}\frac{\delta_r \xi}{2\Delta r}\right\} + \left(\frac{P_t}{\zeta}\frac{\delta_z \xi}{2\Delta z} - 1\right)\frac{\partial K_v}{\partial z}\right]^{K+1}$$

$$+ \left[K_v \left\{ \frac{P_t}{\zeta}\left[\frac{\delta_r^2 \xi}{\Delta r^2} + \frac{\delta_z^2 \xi}{\Delta z^2} + \frac{2+3\lambda_0}{\zeta}\left(\frac{\delta_r \xi^2}{4\Delta r^2} + \frac{\delta_z^2 \xi}{4\Delta z^2}\right)\right]\right.\right.$$

$$\left(\frac{2+3\lambda}{P_b}\ \frac{\partial P_b}{\partial z} + 3\ \ln\ \left(\frac{P_b}{P_t}\right)\frac{\partial \lambda}{\partial z} - \frac{2+3\lambda}{\zeta}\frac{\delta_z \xi}{2\Delta z}\right) + \frac{P_t}{r\zeta}\frac{\delta_r \xi}{2\Delta r}\ \}$$

$$+ \left(\frac{P_t}{\zeta}\frac{\delta_z \xi}{2\Delta z} - 1\right) \quad \frac{\partial K_v}{\partial z}\ ]^K$$

$$- \frac{2\eta\lambda(1-S_r)}{P_b^{2+2\lambda}}\ \frac{P_t^{2+2\lambda}}{\zeta}\ \left(\frac{\xi^{K+1}-\xi^K}{\Delta\tau}\right) = 0 \quad \ldots\ldots \quad [76]$$

in which K+1 superscript denotes the advance time step K superscript denotes the current time step.

Let us use the square grid network, $\Delta s = \Delta r = \Delta z$ and multiply the above equation by ζ and $\Delta s^2 = \Delta r^2 = \Delta z^2$ to get the following equation:

$$F = [\ K_v\ \{\ P_t\ [\ \delta_r^{\ 2}\xi + \delta_z^{\ 2}\xi + \frac{2+3\lambda_o}{\zeta}\left(\frac{\delta_r \xi^2}{4} + \frac{\delta_z \xi^2}{4}\right)\ ]$$

$$- \frac{(2+3\lambda)P_t}{\zeta}\ \frac{\delta_r \xi^2}{4} \quad + \left(P_t\ \frac{\delta_z \xi}{2} - \zeta\Delta s\right)$$

$$\left(\frac{2+3\lambda}{P_b}\ \frac{\partial P_b}{\partial z}\ \Delta s \quad + 3\ \ln\ \left(\frac{P_b}{P_t}\right)\ \frac{\partial\lambda}{\partial z}\ \Delta s - \frac{2+3\lambda}{\zeta}\ \frac{\delta_z \xi}{2}\right)$$

$$- \frac{(2+3\lambda)P_t}{\zeta^2}\ \frac{\delta_r \xi^2}{4\Delta r^2} + \left(\frac{P_t}{\zeta}\ \frac{\delta_z \xi}{2\Delta z} - 1\right)$$

$$+ \frac{P_t}{r}\ \frac{\delta_r \xi}{2}\ \Delta s\ \} + \left(P_t\ \frac{\delta_z \xi}{2} - \zeta\ \Delta s\right)\ \frac{\partial K_v}{\partial z}\ \Delta s\ ]^{K+1}$$

$$+ [\ K_v\ \{\ P_t\ [\ \delta_r^{\ 2}\xi \ + \delta_z^{\ 2}\xi + \frac{2+3\lambda_o}{\zeta}\ \left(\frac{\delta_r \xi^2}{4} + \frac{\delta_z \xi^2}{4}\right)\ ]$$

$$- \frac{(2+3\lambda)P_t}{\zeta}\ \frac{\delta_r \xi^2}{4} + \left(\ P_t\ \frac{\delta_z \xi}{2} - \zeta\ \Delta s\right)$$

$$\left(\frac{2+3\lambda}{P_b}\ \frac{\partial P_b}{\partial z}\ \Delta s + 3\ \ln\ \left(\frac{P_b}{P_t}\right)\ \frac{\partial\lambda}{\partial z}\ \ \Delta s - \frac{2+3\lambda}{\zeta}\ \frac{\delta_z \xi}{2}\ \right)$$

$$+ \frac{P_t}{r}\ \frac{\delta_r \xi}{2}\ \ \Delta s\ \} \ + \left(P_t\ \frac{\delta_z \xi}{2} - \ \zeta\,\Delta s\right)\ \frac{\partial K_v}{\partial z}\ \Delta s]^K$$

$$- \frac{2\eta\lambda(1-S_r)}{P_b^{2+2\lambda}}\ \frac{\Delta s^2}{\Delta\tau}\ \ P_t^{2+2\lambda}\ (\xi^{K+1} - \xi^K) = 0$$

$$\ldots\ldots\ldots\ldots \quad [77]$$

If subscripts j and i denote the space subscripts at axial and radial directions respectively, and superscript K denotes the time step such that:

$$j = 1 + (D-z)/\Delta s \quad \ldots\ldots\ldots \quad [78]$$

$$i = 1 + \frac{r}{\Delta s} \quad \ldots\ldots\ldots \quad [79]$$

$$K = 1 + \frac{\tau}{\Delta\tau} \quad \ldots\ldots\ldots \quad [80]$$

The finite difference equation for the interior grid point is,

$$F_{j,i} = [\ K_v\ \{\ P_t\ [\ (\xi_{j,i+1} + \xi_{j,i-1} - 2\xi_{j,i})$$

$$+ (\xi_{j+1,i} + \xi_{j-1,i}\ - 2\xi_{j,i})$$

$$+ \frac{2+3\lambda_o}{\zeta}\ \left(\ \frac{(\xi_{j,i+1} - \xi_{j,i-1})^2}{4} + \frac{(\xi_{j-1,i} - \xi_{j+1,i})^2}{4}\ \right)\ ]$$

$$- \left(\ \frac{(2+3\lambda)P_t}{\zeta}\ \frac{(\xi_{j,i+1} - \xi_{j,i-1})^2}{4}\ \right)$$

$$+ \left(P_t\ \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2} - \zeta\ \Delta s\right)$$

$$\left(\ \frac{2+3\lambda}{P_b}\ \ \frac{\partial P_b}{\partial z}\ \ \Delta s + 3\ \ln\ \left(\frac{P_b}{P_t}\right)\ \frac{\partial\lambda}{\partial z}\ \Delta s\right.$$

$$\left. - \ \frac{(2+3\lambda)}{\zeta}\ \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2}\right.$$

$$+ \left(\ \frac{P_t}{r}\ \frac{(\xi_{j,i+1} - \xi_{j,i-1})}{2}\ \ \ \Delta s\right)\ \}$$

$$+ \left(P_t\ \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2} - \zeta\ \Delta s\right)\ \ \frac{\partial K_v}{\partial z}\ \Delta s]^{K+1}$$

$$+ [\ K_v\ \{\ P_t\ [\ (\ \xi_{j,i+1} + \xi_{j,i-1} - 2\xi_{j,i})$$

$$+ (\xi_{j+1,i} + \xi_{j-1,i} - 2\xi_{j,i}) + \frac{2+3\lambda_o}{\zeta}$$

$$+ \left(\ \frac{(\xi_{j,i+1} - \xi_{j,i-1})^2}{4}\ \ \frac{(\xi_{j-1,i} - \xi_{j+1,i})^2}{4}\ \right)\ ]$$

$$- \left(\ \frac{(2+3\lambda)P_t}{\zeta}\ \frac{(\xi_{j,i+1} - \xi_{j,i-1})^2}{4}\ \right)$$

$$+ \quad (P_t \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2} - \zeta \Delta s) \; (\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} \Delta s$$

$$+ 3 \ln (\frac{P_b}{P_t}) \frac{\partial \lambda}{\partial z} \Delta s \quad - \frac{(2+3\lambda)}{\zeta} \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2}$$

$$+ (\frac{P_t}{r} \frac{(\xi_{j,i+1} - \xi_{j,i-1})}{2} \Delta s)\}$$

$$+ (P_t \frac{(\xi_{j-1,i} - \xi_{j+1,i})}{2} - \zeta \Delta s) \frac{\partial K_v}{\partial z} \Delta s \;]^K$$

$$- \frac{2n\lambda(1-S_r)}{P_b^{2+2\lambda}} \frac{\Delta s^2}{\Delta \tau} P_{ave}^{2+2\lambda} (\xi_{j,i}^{K+1} - \xi_{j,i}^{K}) = 0 \quad \ldots\ldots\ldots [81]$$

in which

$$P_{ave} = (P_{t_{j,i}}^{K+1} + P_{t_{j,i}}^{K})/2 \quad \ldots [82]$$

Finite Difference Operators for Boundary Grid Points

Operator for Boundary ① - ②

Since the value of r equals zero at the axis of symmetry, the term,

$$\frac{P_t}{r} \frac{(\xi_{j,i+1}-\xi_{j,i-1})}{2} \Delta s,$$

in the flow equation will be undefined along the line singularity. This is the reason why an operator cannot be developed by combining the central difference approximation of $\partial\xi/\partial r = 0$ and replacing it with those in the flow equation to handle the non-existing points $\xi_{j,i-1}$ (i.e., $\delta_r \xi = \xi_{j,2} - \xi_{j,o} = 0$). The boundary condition ① - ② in this problem has been handled by setting $\xi_{j,1} = \xi_{j,2}$ in the finite difference equation.

Operator for Boundary ② - ③

The case for which the flux rate is specified (non Dirichlet) condition is equivalent to specifying that the axial component of velocity, W, is constant over the boundary and equal to the infiltration rate. Therefore the boundary condition equation from Darcy's law is

$$W = - K \frac{\partial h_t}{\partial z} \quad \ldots\ldots\ldots [83]$$

$$h_t = D - P_t \quad \ldots\ldots\ldots [84]$$

in which W is negative being LT^{-1} in a downward direction (input data is a positive value but the computer program makes the sign change) or

$$W = - K \frac{\partial(D - P_t)}{\partial z} = K (\frac{\partial P_t}{\partial z} - 1) \quad \ldots [85]$$

$$K = K_a K_v K_r \quad \ldots\ldots\ldots [86]$$

$$W = K_a K_v K_r (\frac{\partial P_t}{\partial z} - 1) \quad \ldots\ldots [87]$$

$$\frac{W}{K_a K_v K_r} + 1 = \frac{\partial P_t}{\partial z} \quad \ldots\ldots\ldots [88]$$

$$\frac{\partial P_t}{\partial z} = \frac{P_t}{\zeta} \frac{\partial \xi}{\partial z} \quad \ldots\ldots\ldots [89]$$

Approximating $\partial\xi/\partial z$ with second order central differences centered on the boundary (j=1) will finally eliminate the value of ξ at a nonexistent grid point outside of the boundary ② - ③ by combining with the finite difference operation for interior grid points.

$$\frac{\zeta}{P_t} [\frac{W}{K_a K_v K_r} + 1] = \frac{\partial \xi}{\partial z} = \frac{\xi_{j-1,i} - \xi_{j+1,i}}{2\Delta s} \quad [90]$$

$$2\Delta s \frac{\zeta}{P_t} [\frac{W}{K} + 1] = \xi_{j-1,i} - \xi_{j+1,i} \quad \ldots [91]$$

The value of ξ for a nonexistent grid point outside of the boundary for j=1 from above equation is

$$\xi_{0,i} = \xi_{2,i} + 2\Delta S \frac{\zeta}{P_t} [\frac{W}{K} + 1] \quad \ldots\ldots [92]$$

which combines with finite difference operator for interior grid points Equation 81 and results in the following finite difference operator for the boundary ② - ③.

$$F_{1,i} = [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\xi_{1,i})$$

$$+ 2(\xi_{2,i} + \Delta S \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{1,i})$$

$$+ \frac{2+3\lambda_o}{\zeta} (\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4} + \frac{[2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1)]^2}{4})]$$

$$- (\frac{(2+3\lambda)P_t}{\zeta} \frac{(\xi_{1,i+1}, \xi_{1,i-1})^2}{4})$$

$$+ [\frac{P_t}{2} (\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i})$$

$$- \zeta\Delta s] (\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} \Delta s + 3 \ln (\frac{P_b}{P_t}) \frac{\partial \lambda}{\partial z} \Delta s$$

$$- \frac{(2+3\lambda)}{2\zeta} (\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i}))$$

$$+ (\frac{P_t}{r} \frac{(\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s) \}$$

$$+ (\frac{P_t}{2}$$

$$(\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i}) - \zeta\Delta s) \frac{\partial K_v}{\partial z} \Delta s]^{K+1}$$

$$+ [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\xi_{1,i})$$

$$+ 2(\xi_{2,i} + \Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{1,i})$$

$$+ \frac{2+3\lambda_o}{\zeta} (\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4} + \frac{[2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1)]^2}{4})]$$

$$- (\frac{(2+3\lambda)P_t}{\zeta} \frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4})$$

$$+ [\frac{P_t}{2} (\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i}) - \zeta\Delta S]$$

$$(\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} \Delta s + 3 \ln (\frac{P_b}{P_t}) \frac{\partial \lambda}{\partial z} \Delta s$$

$$- \frac{(2+3\lambda)}{2\zeta} (\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i}))$$

$$+ (\frac{P_t}{r} \frac{(\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s) \}$$

$$+ (\frac{P_t}{2} (\xi_{2,i} + 2\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{2,i}) - \zeta\Delta s) \frac{\partial K_v}{\partial z} \Delta s]^{K}$$

$$- \frac{2\eta\lambda(1-S_r)}{P_b^{2+2\lambda}} \frac{\Delta s^2}{\Delta\tau} P_{ave}^{2+2\lambda} (\xi_{1,i}^{K+1} - \xi_{1,i}^{K}) = 0 \qquad [93]$$

Assume W/K_a to be the dimensionless flux, VK

$$\frac{W}{K} = \frac{W}{K_a K_v K_r} = \frac{VK}{K_v K_r} \qquad [94]$$

from Equation 35 we can write

$$\frac{W}{K} = \frac{VK}{K_v \left(\frac{P_b}{P_t} \right)^{2+3\lambda}} \qquad [95]$$

The input data for parameter, W, is a positive number with units of LT-1. The negative sign of the W is handled in the subroutine F1 and by multiplying the equation above by a minus sign. Upon simplifying the above equation, the finite difference operator for the boundary over which water is applied, ② - ③ is as follows:

$$F_{1,i} = [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\xi_{1,i})$$

$$+ 2(\xi_{2,i} + \Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{1,i})$$

$$+ \frac{2+3\lambda_o}{\zeta} (\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4} + [\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1)]^2]$$

$$- (\frac{(2+3\lambda)P_t}{\zeta} \cdot \frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4})$$

$$+ (\zeta \Delta s \frac{W}{K}) (\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} \Delta s + 3 \ln (\frac{P_b}{P_t}) \frac{\partial \lambda}{\partial z} \Delta s$$

$$- \frac{2+3\lambda}{P_t} \Delta s (\frac{W}{K} + 1)) + (\frac{P_t}{r} \frac{\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s) \}$$

$$+ (\zeta \Delta s \frac{W}{K}) \frac{\partial K_v}{\partial z} \Delta s]^{K+1}$$

$$+ [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\xi_{1,i})$$

$$+ 2(\xi_{2,i} + \Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1) - \xi_{1,i}) + \frac{2+3\lambda_o}{\zeta}$$

$$(\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4} + [\Delta s \frac{\zeta}{P_t} (\frac{W}{K} + 1)]^2]$$

$$- (\frac{(2+3\lambda)P_t}{\zeta} \cdot \frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4}) + (\zeta \Delta s \frac{W}{K})$$

$$(\frac{2+3\lambda}{P_b} \frac{\partial P_b}{\partial z} \Delta s + 3 \ln (\frac{P_b}{P_t}) \frac{\partial \lambda}{\partial z} \Delta s - \frac{2+3\lambda}{P_t} \Delta s (\frac{W}{K} + 1))$$

$$+ (\frac{P_t}{r} \frac{\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s)\} + (\zeta \Delta s \frac{W}{K}) \frac{\partial K_v}{\partial z} \Delta s]^{K}$$

$$- \frac{2\eta\lambda(1 - S_r)}{P_b^{2+2\lambda}} \frac{\Delta s^2}{\Delta\tau} P_{ave}^{2+2\lambda} (\xi_{1,i}^{K+1} - \xi_{1,i}^{K}) = 0$$

for

$$i = 2 \ldots N2X \qquad [96]$$

where N2X is the number of points in radial direction to outer edge of circle of application.

Operator for Boundary ③ - ④

Along this horizontal boundary the vertical component of seepage velocity is zero (no water application or evaporation from this surface). The finite difference operator for this boundary will be obtained by substituting W equals zero in Equation 92. The operator for boundary ③ - ④ is as follows:

$$F_{1,i} = [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\xi_{1,i})$$

$$+ 2(\xi_{2,i} + \Delta s \frac{S}{P_t} - \xi_{1,i}) + \frac{2+3\lambda_o}{\zeta} (\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4}$$

$$+ [\Delta s \frac{\zeta}{P_t}]^2)] - (\frac{(2+3\lambda)}{\zeta} P_t \frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4})$$

$$+ (\frac{P_t}{r} \frac{(\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s) \}]^{K+1}$$

$$+ [K_v \{ P_t [(\xi_{1,i+1} + \xi_{1,i-1} - 2\ _{1,i})$$

$$+ 2(\xi_{2,i} + \Delta s \frac{\zeta}{P_t} - \xi_{1,i}) + \frac{2+3\lambda_o}{\zeta} (\frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4}$$

$$+ [\Delta s \frac{\zeta}{P_t}]^2)] - (\frac{(2+3\lambda)}{\zeta} P_t \frac{(\xi_{1,i+1} - \xi_{1,i-1})^2}{4})$$

$$+ (\frac{P_t}{r} \frac{\xi_{1,i+1} - \xi_{1,i-1})}{2} \Delta s) \}]^K$$

$$- \frac{2\eta\lambda(1-S_r)}{P_b^{2+2\lambda}} \frac{\Delta s^2}{\Delta\tau} - P_{ave}^{(2+2\lambda)} (\xi_{1,i}^{K+1} - \xi_{1,i}^{K}) = 0$$

for

$$i = N2X + 1 \ldots N_r - 1 \qquad [97]$$

where N_r equals subscript denoting number of grid lines from the axis of symmetry to the outside radius of the problem.

Operator for Boundary ④ - ⑤

This boundary is assumed to be far enough from the source of water that no flow occurs in its vicinity. Thus, the values of hydraulic head do not change along boundary ④ - ⑤. No definite difference operator is needed (Dirichlet type).

$$\xi_o = \xi$$

for

$$j = 1, N_z$$

and

$$i = N_r \qquad [98]$$

where N_z equals subscript denoting number of grid lines from the surface to the bottom boundary.

Operator for Boundary ⑤ - ①

The finite difference equation for the bottom boundary (when unit saturation has not been achieved, or is not of the Dirichlet type) is the same as the operator for boundary ③ - ④ in which the subscript j = 1 is replaced by N_z and 2 by N_z-1 (i = 2, . . . N_r - 1). The operator for boundary ⑤ -① is:

$$F_{N_{z,i}} = K_v \{ P_t [\delta_r^2\xi + 2.0 (\xi_{N_{z-1,i}} - \Delta s \frac{\zeta}{P_t} - \xi_{N_{z,i}})$$

$$+ \frac{2+3\lambda_o}{\zeta} (\frac{\delta_r\xi^2}{4} + [\Delta s \frac{\zeta}{P_t}]^2)] - (\frac{(2+3\lambda)P_t}{\zeta} \frac{\delta_r\xi^2}{4})$$

$$+ (\frac{P_t}{r} \frac{\sigma_r\xi}{2} \Delta s)\}]^{K+1} \quad [K_v\{P_t[\delta_r^2 \xi + 2.0$$

$$(\xi_{N_{z-1,i}} - \Delta s \frac{\zeta}{P_t} - \xi_{N_{z,i}}) + \frac{2+3\lambda_o}{\zeta} (\frac{\delta_r\xi^2}{4} + [\Delta s \frac{\zeta}{P_t}]^2)]$$

$$- (\frac{(2+3\lambda)P_t}{\zeta} \frac{\delta_r\xi^2}{4}) + (\frac{P_t}{r} \frac{\delta_r\xi}{2} \Delta s\}]^K$$

$$- \frac{2\eta\lambda(1-S_r)}{P_b^{2+2\lambda}} \frac{\Delta s^2}{\Delta\tau} P_{ave}^{2+2\lambda}(\xi_{N_{z,i}}^{K+1} - \xi_{N_{z,i}}^{K}) = 0$$

for i = 2, . . . N_r - 1.

$$[99]$$

Method of Solution

Writing finite difference operators for all grid points (interior and non Dirichlet boundaries) produces a system of nonlinear algebraic equations for the unknowns $\xi_{j,i}^{K+1}$. Since coefficients in these finite difference operators are functions of ξ, the resulting system of equations is nonlinear. All values of ξ in the system of equations with superscript K are known. All ξ's with a K+1 superscript are unknown and the number of equations equals the number of such unknowns. By solving the system of nonlinear equations, the solution of the infiltration problem advances through one time step Δτ.

The scheme proposed by Jeppson (18) is utilized in solving this system. The scheme combines the line successive relaxation iterative method with the Newton-Raphson method, that is, an iteration is created within an iteration.

The iterative Newton-Raphson formula for a system of equations is:

$$(\vec{\xi}^{K+1})^{m+1} = (\vec{\xi}^{K+1})^m - \vec{X}^m \qquad [100]$$

where superscript m is the iteration number and $\vec{X}$ is the solution vector of linear system of equations

$$(D)^m \vec{X}^m = (\vec{F})^m \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad [101]$$

in which D is the Jacobian and $\vec{F}$ consists of the elements composed of the finite difference operations, $F_{j,i}$. See Equation 102.

The innermost iteration solves for the values of ξ^{K+1}'s along consecutive vertical finite difference lines assuming that the ξ^{K+1}'s on the previous and next line are known. That is, two outer bands of matrix, D, are ignored. Consequently, the banded Jacobian reduced to a tridiagonal matrix. This tridiagonal system can be solved by a single pass through the rows with a Gaussian elimination to bring the terms below the diagonal to zero. Thereafter the unknown values of $\vec{X}$ are computed by back substitution. The inner most iteration continues until the sum of absolute change in X's along the line becomes less in magnitude than specified error (approximately 10^{-7}). The same procedure occurs at the next vertical line unit. All lines have to be solved for. One such pass constitutes an outer iteration, and provides values of ξ's throughout the flow region which are closer to the correct solution. During each outer iteration the sum of the accumulated absolute changes in the values of ξ from the inner iterations along individual lines is accumulated. When this sum (SUMT) becomes less than a second error (error x 100), the iteration is terminated. However, when the Newton-Raphson iteration does not converge to the specified error within the allowable number of iterations, a message to this effect is printed.

$$D = \left| \begin{array}{cccccccccc}
\frac{\partial F_{11}}{\partial \xi_{11}} & \frac{\partial F_{11}}{\partial \xi_{21}} & 0 \ldots & 0 & \frac{\partial F_{11}}{\partial \xi_{12}} & 0 \ldots & & & & \\
\frac{\partial F_{21}}{\partial \xi_{11}} & \frac{\partial F_{21}}{\partial \xi_{21}} & \frac{\partial F_{21}}{\partial \xi_{31}} & 0 \ldots & 0 & \frac{\partial F_{21}}{\partial \xi_{22}} & 0 \ldots & & & \\
0 & \frac{\partial F_{31}}{\partial \xi_{21}} & \frac{\partial F_{31}}{\partial \xi_{31}} & \frac{\partial F_{31}}{\partial \xi_{41}} & 0 \ldots 0 & \frac{\partial F_{31}}{\partial \xi_{32}} & 0 \ldots & & & \\
 & \ddots & \ddots & \ddots & & \ddots & & & & \\
\frac{\partial F_{12}}{\partial \xi_{11}} & 0 \ldots & 0 & \frac{\partial F_{12}}{\partial \xi_{12}} & \frac{\partial F_{12}}{\partial \xi_{22}} & \ldots & \frac{\partial F_{12}}{\partial \xi_{13}} & & & \\
\ddots & & & & \ddots & & & & & \\
0 & \frac{\partial F_{22}}{\partial \xi_{21}} & & & & \ddots & & & & \\
 & & & & & & \ddots & & & \\
 & & & & \frac{\partial F_{N_z N_r}}{\partial \xi_{N_z N_{r-1}}} & \ldots & \frac{\partial F_{N_z N_r}}{\partial \xi_{N_{z-1} N_r}} & \frac{\partial F_{N_z N_r}}{\partial \xi_{N_z N_r}} & &
\end{array} \right| \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad [102]$$

METHODS AND PROCEDURES

In order to model heterogeneous soils, the general flow equation, Equation 42, was derived such that each of the parameters: λ, P_b, S_r, K_v, and η may be functions of dimensionless depth, z. A subroutine in the program defines any specified variations (linear, quadratic, etc.) of all soil parameters by input of constants. Except for variation of parameter K_v which is a dimensionless function of depth, the other variations of soil parameters were chosen such that the average value of the parameter would be equal to its constant value in the homogeneous soil example. In the computation, K_v is always given a value of 1 at the soil surface. The reason for specifying $K_v = 1$ at the soil surface is to make saturated hydraulic conductivity terms in Equation 19 equal to K_a. To simplify the following presentation, these variations have been specified to be linear and continuous functions of depth z. The variable z has a maximum value of 2 on the soil surface and z = 0 at bottom boundary. The linear distributions of soil parameters, using FORTRAN notation, are:

$$\lambda = AL + BL*z \quad [103]$$

$$P_b = APB + BPB*z \quad [104]$$

$$S_r = ASR + BSR*z \quad [105]$$

$$K_v = AKV + BKV*z \quad [106]$$

$$\eta = APOR + BPOR*z \quad [107]$$

A practical range for each soil parameter is established. Each parameter was varied once with the largest value at the soil surface and then again with its smallest value at the soil surface and largest value at the bottom. Table 1 summarizes the specification used in obtaining the solutions presented in the various tables hereafter. Subsequently, these solutions are referred to by the number in the first column of Table 1.

Table 1. Summary of specification of problems.

Problem Number	Soil Parameters λ	P_b	S_r	η	K_v	Initial Hydraulic Head, in Feet	Depth	Surface Saturation, Percent	Radius of Circular Area in Feet	Characteristic Length, in Feet
1	1.0	1.0	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
2	0.7+0.3z	1.0	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
3	1.0	0.7+0.3z	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
4	1.0	1.0	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
5	1.0	1.0	0.15	0.18+0.22z	1.0	-8.0	2.0	90	0.3	1.0
6	1.0	1.0	0.15	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
7	1.3-0.3z	1.0	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
8	1.0	1.3-0.3z	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
9	1.0	1.0	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
10	1.0	1.0	0.15	0.62-0.22z	1.0	-8.0	2.0	90	0.3	1.0
11	1.0	1.0	0.15	0.40	1.40-0.2z	-8.0	2.0	90	0.3	1.0
12	0.7+0.3z	0.7+0.3z	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
13	1.3-0.2z	0.7+0.3z	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
14	1.3-0.2z	1.3-0.3z	0.15	0.40	1.0	-8.0	2.0	90	0.3	1.0
15	0.7+0.3z	1.0	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0

TABLE 1.--Continued.

Problem Number	Soil Parameters λ	P_b	S_r	η	K_v	Initial Hydraulic Head, in Feet	Depth	Surface Saturation, Percent	Radius of Circular Area in Feet	Characteristic Length in Feet
16	0.7+0.3z	1.0	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
17	1.3-0.3z	1.0	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
18	1.3-0.3z	1.0	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
19	1.3-0.3z	1.0	0.15	0.18+0.22z	1.0	-8.0	2.0	90	0.3	1.0
20	0.7+0.3z	1.0	0.15	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
21	0.7+0.3z	1.0	0.15	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
22	1.3-0.3z	1.0	0.15	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
23	1.3-0.3z	1.0	0.15	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
24	1.0	0.7+0.3z	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
25	1.0	0.7+0.3z	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
26	1.0	1.3-0.3z	0.05-0.1z	0:40	1.0	-8.0	2.0	90	0.3	1.0
27	1.0	1.3-0.3z	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
28	1.0	0.7+0.3z	0.15	0.18+0.22z	1.0	-8.0	2.0	90	0.3	1.0
29	1.0	0.7+0.3z	0.15	0.62-0.22z	1.0	-8.0	2.0	90	0.3	1.0
30	1.0	0.7+0.3z	0.15	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
31	1.0	0.7+0.3z	0.15	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
32	1.0	1.3-0.3z	0.15	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
33	1.0	1.0	0.05+0.1z	0.18+0.22z	1.0	-8.0	2.0	90	0.3	1.0
34	1.0	1.0	0.05+0.1z	0.62-0.22z	1.0	-8.0	2.0	90	0.3	1.0
35	1.0	1.0	0.25-0.1z	0.18+0.22z	1.0	-8.0	2.0	90	0.3	1.0
36	1.0	1.0	0.05+0.1z	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
37	1.0	1.0	0.05+0.1z	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
38	1.0	1.0	0.25-0.1z	0.40	0.6+0.2z	-8.0	2.0	90	0.3	1.0
39	1.0	1.0	0.25-0.1z	0.40	1.4-0.2z	-8.0	2.0	90	0.3	1.0
40	1.0	1.0	0.15	0.18+0.22z	0.6+0.2z	-8.0	2.0	90	0.3	1.0
41	1.0	1.0	0.15	0.18+0.22z	1.4-0.2z	-8.0	2.0	90	0.3	1.0
42	1.0	1.0	0.15	0.62-0.22z	0.6+0.2z	-8.0	2.0	90	0.3	1.0
43	0.7+0.3z	0.7+0.3z	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
44	1.3-0.3z	0.7+0.3z	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
45	1.3-0.3z	1.3-0.3z	0.05+0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
46	1.3-0.3z	0.7+0.3z	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0
47	1.3-0.3z	1.3-0.3z	0.25-0.1z	0.40	1.0	-8.0	2.0	90	0.3	1.0

REPRESENTATIVE SOLUTIONS AND ANALYSIS OF RESULTS

Initial and Boundary Conditions

Initial Conditions

Prior to initiation of infiltration, it is assumed that the water in the soil is in static equilibrium with resulting constant hydraulic head equal to -8.0 feet (-2.44 meters).

Boundary Conditions

The circular area through which water is infiltrating was assumed to have at a constant saturation at all times (specified saturation condition) of 90 percent. A horizontal lower boundary is assumed to exist at the bottom of the soil profile and no water will flow into the bottom boundary unless the soil at the bottom of the profile becomes fully saturated. The outer boundary is far enough from the source of water that the wetting front cannot reach to this boundary.

Dimensions and Problem Specification

For all problems the dimensionless depth from soil surface to the bottom boundary was D = 2.0 and the dimensionless radius of circular area was taken as $r_a = 0.3$. A dimensionless time increment $\Delta\tau$ of 0.005 was used to start the solution. Thereafter values of $\Delta\tau$ are periodically multiplied by values larger than one to increase the efficiency and decrease the printout time. The solutions shown were terminated before the wetting front had penetrated to the bottom boundary or cylindrical outer boundary.

Methodology

The methodology includes the following steps:

a) A base solution for homogeneous soil in which all parameters are constant throughout the soil profile was obtained (problem 1).

b) Obtaining solutions in which only one parameter in each is varied as a linear and continuous function of z, assuming no interaction between parameters (problems 2 through 11).

c) The description and study of the soil heterogeneity as explained in this study raises another question. Is the heterogeneity effect due to two, or more, soil parameters varying simultaneously the same as the sum of the effects due to each parameter varying individually? In other words, is there interaction between the soil parameters? To investigate the existence of interaction, solutions were obtained with two and three parameters varying simultaneously (problems 12 through 47) and then compared with results obtained by adding the sum of deviations from the homogeneous case of the solutions obtained when each parameter varied separately.

Whether interaction exists is of interest both in studies devoted to defining infiltration characteristics as well as studies devoted to estimating variations in parameter values from observed infiltration characteristics. If no interaction exists, both types of studies are much simpler than they would be if interaction does exist. Should the former be true then it is possible to determine the effects of each single parameter independently of the others and graphs or tables defining each such individual effect could be combined to obtain the composite effect. Furthermore, when attempting to determine the variability of one parameter from field data it would not be necessary to simultaneously be concerned with the variability of other parameters. Should interaction exist then neither of these would be possible. Rather the influence of all parameters would have to be considered together.

NUMERICAL SOLUTION RESULTS

In this study 47 problems have been solved in order to find the effects and interactions of the variation of soil parameters on the solution of the flow equation. Problem No. 1 was solved by specifying none of the soil parameters vary (homogeneous soil) and is used for a basis of comparison. In problems 2 to 11 only one parameter in each is varied with depth, assuming no interaction between soil parameters. The existence of differences between homogeneous and such special heterogeneous soils is defined by comparing the results from problem 1 with those from problems 2 to 11. The distribution of saturation, capillary pressure head, and existing differences between homogeneous and these heterogeneous soils along the axis of symmetry at dimensionless time $\tau = 1.88$ for each solution is given in Appendix I in Tables 2 and 3.

Also the infiltration rate, volume of water applied, vertical and horizontal movement of wetting front and existing differences between homogeneous and these special heterogeneous soils at several time steps is given in Appendix I in Tables 4 through 7. From the differences in these tables, it is clear that heterogeneity has a significant influence on infiltration characteristics. Each parameter, however, causes characteristics that are different.

Thirty-one solutions have been obtained for problems specified with two parameters varying simultaneously. Problems 12 through 42 are these problems. Comparing their solutions with those of the previous problems allows some insight into existence of their effects and interactions, or allows an investigation of possibly applying the additive law of effect. If the additive law of effects applies, that is no interaction exists, then it is possible to predict the effect of heterogeneity of soil for more than one varied parameter when acting together by simply adding their effect when each acts separately.

Appendix II, Tables 8 and 9, shows the distribution of saturation and capillary pressure and main effect and interaction effects for each problem at the last time step $\tau = 1.88$. The infiltration rate, the volume of water absorbed, the vertical and horizontal movement of wetting front, main effects and interaction effects at several time steps from problems 12 through 42 are given in Tables 10, 11, 12, and 13 of Appendix II. The main effects and interaction effects are defined as:

> The main effect of a factor is a measure of the change in the response variable to change in the level of the factor averaged over all levels of all other factors.
>
> Interaction is the differential response to one factor in combination with varying levels of a second factor applied simultaneously. That is, interaction is an additional effect due to combined influence of two (or more) factors.

In this situation in which there are only two variables, i.e., λ and P_b the main effect and interaction of λ and P_b is computed as:

Main effect of heterogeneity due to variation of parameter λ = [solution (λ, P_b) + solution (λ) - solution (P_b) - solution (0)]/2 . . [108]

Main effect of heterogeneity due to variation of parameter P_b = [solution (λ, P_b) + solution (P_b) - solution (λ) - solution (0)]/2 . . . [109]

Interaction effect due to combined influence of parameters λ and P_b = [solution (λ, P_b) - (solution (λ) + solution (P_b) - solution (0))]/2 . . . . [110]

in which solution (λ, P_b) represents any feature of the solution (i.e. distribution of saturation, capillary pressure, infiltration rate, etc.) when the pore size distribution exponent, λ, and bubbling pressure are varied. Solution (λ) represents any feature of the solution in which only pore size distribution exponent, λ, is varied while the other parameters (i.e., P_b, S_r, η, and K_v) are constant along the soil profile. Solution (P_b) represents any feature of the solution when any bubbling pressure, P_b, is varied while the other parameters (i.e., λ, S_r, η, K_v) are constant along the soil profile. Solution (0) represents any feature of the solution No. 1 when all of the soil parameters (λ, P_b, S_r, η, and K_v) are constant along the soil profile (homogeneous soil).

To have more assurance of these results, solutions to problems No. 42 through 47 are obtained. In these problems, three parameters (λ, P_b, and S_r) vary simultaneously and remaining parameters (η and K_v) are constant along the soil profile. If the parameters λ, P_b, and S_r vary simultaneously, the main effects and interaction effects are calculated as follows:

Main effect of heterogeneity due to variation of parameter λ = [- solution (0) + solution (λ) - solution (P_b) + solution (λ, P_b) - solution (S_r) + solution (λ, S_r) - solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [111]

Main effect of heterogeneity due to variation of parameter P_b = [- solution (0) - solution (λ) + solution (P_b) + solution (λ, P_b) - solution (S_r) - solution (λ, S_r) + solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [112]

Main effect of heterogeneity due to variation of parameter S_r = [- solution (0) - solution (λ) - solution (P_b) - solution (λ, P_b) + solution (S_r) + solution (λ, S_r) + solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [113]

Interaction effect due to combined influence of parameters λ and P_b = [+ solution (0) - solution (λ) - solution (P_b) + solution (λ, P_b) + solution (S_r) - solution (λ, S_r) - solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [114]

Interaction effect due to combined influence of parameters λ and S_r = [+ solution (0) - solution (λ) + solution (P_b) - solution (λ, P_b) - solution (S_r) + solution (λ, S_r) - solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [115]

Interaction effect due to combined influence of parameters P_b and S_r = [+ solution (0) + solution (λ) - solution (P_b) - solution (λ, P_b) - solution (S_r) - solution (λ, S_r) + solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [116]

Interaction effect due to combined influence of parameters λ, P_b, and S_r = [- solution (0) + solution (λ) + solution (P_b) - solution (λ, P_b) + solution (S_r) - solution (λ, S_r) - solution (P_b, S_r) + solution (λ, P_b, S_r)]/4 . . . . [117]

The distributions of saturated and capillary pressure along the axis of symmetry at dimensionless time τ = 1.88 and also the magnitudes of infiltration rate, volume of water applied, vertical and horizontal movement of wetting fronts at each time step is tabulated in Appendix III in Tables 14 through 19. The main effects of heterogeneity due to variation of each three parameters, and their interactive effects which are computed from Equations 111 through 117 are also given in Appendix III in Tables 14 through 19.

Nassehzadeh-Tabrizi et al. (26) obtained data from the numerical solutions and found best fit by linear regression analyses in order to quantify and define the relationship between varying soil parameters and dependent variable of infiltration process. For these analyses, data were obtained from solutions to problems 1 through 11 at the following dimensionless times, τ: 0.2, 0.5, 1.0, and 1.5. The independent variables for these analyses are the B coefficient (in Equations 121, 122, and 123) of all five soil parameters and τ, and differences between homogeneous and heterogeneous infiltration rates; the depth of penetration and radial movement are dependent variables. The regression program has the capability that the independent variable could either have its actual value or a transformation of it. For example, $(BPB)^2$, $(BL)^2$ are transformations of B coefficients of bubbling pressure, and pore size distribution exponent. Several analyses were made for different transformations of independent variables. The best fit was found to be a quadratic relationship for all five soil variables and cubic relationships of the time, τ. The coefficients for a general equation to fit a curve through data for 13 independent variables and one dependent variable were computed. The general expressions relate the difference between the dependent variable of infiltration for homogeneous and heterogeneous cases or

$$\Delta f = f_{homo.} - f_{hetero.} \quad [118]$$

$$\Delta V = V_{homo.} - V_{hetero.} \quad [119]$$

$$\Delta H = H_{homo.} - H_{hetero.} \quad [120]$$

to the soil parameters and time, in which f is the dimensionless infiltration rate; V is the dimensionless vertical penetration of wetting front; and H is the dimensionless horizontal movement of wetting front.

The resulting regression equations are:

$$\begin{aligned}\Delta f = & -0.003658 + 0.03855(BKV) - 0.00075(BKV)^2 \\ & + 0.2777(BSR) + 0.2110(BSR)^2 - 0.0882(BPB) \\ & - 0.00844(BPB)^2 + 0.45487(BL) + 1.0393(BL)^2 \\ & - 0.08291(BPOR) + 0.018182(BPOR)^2 + 0.0080363(\tau) \\ & - 0.0051842(\tau)^2 + 0.0014946(\tau)^3 \quad (R^2 = 0.98)\end{aligned} \quad [121]$$

$$\begin{aligned}\Delta V = & - 0.014 + 0.232(BKV) - 0.155(BKV)^2 + 0.173(BSR) \\ & - 0.03(BSR)^2 + 0.23567(BPB) - 0.12111(BPB)^2 \\ & + 0.23367(BL) + 0.83444(BL)^2 + 0.28864(BPOR) \\ & - 0.12397(BPOR)^2 + 0.038548(\tau) - 0.033138(\tau)^2 \\ & + 0.010726(\tau)^3 \quad (R^2 = 0.92)\end{aligned} \quad [122]$$

$$\begin{aligned}\Delta H = & \ 0.0070762 + 0.0185(BKV) + 0.0125(BKV)^2 \\ & - 0.18900(BSR) - 0.15(BSR)^2 - 0.55(BPB) \\ & - 0.27778(BPB)^2 + 0.99667(BL) - 0.10(BL)^2 \\ & - 0.85455(BPOR) - 1.2479(BPOR)^2 - 0.024151(\tau) \\ & + 0.028802(\tau)^2 - 0.011772(\tau)^3 \quad (R^2 = 0.98)\end{aligned} \quad [123]$$

in which BKV, BSR, BPB, BL, and BPOR represent the B coefficient of K_v, S_r, P_b, λ, and η, respectively. Equations 121, 122, and 123 are solved by the three coaxial graphs, Figures 4, 5, and 6, respectively. Each coaxial graph provides the magnitude of dependent variables Δf, ΔV, and ΔH, and show how time, τ, and rate of change of η, P_b, λ, S_r, and K_o effect them.

In using the coaxial graphs, first take a specific dimensionless time parameter, τ, next select appropriate B coefficient for each soil parameter, then enter each individual plot with these coefficients in the order shown by the line with an arrow, until the axis for Δf, ΔV, or ΔH is reached. On each figure the homogeneous case is solved.

The values Δf, ΔV, and ΔH can be considered as correction factors in obtaining infiltration rate, vertical penetration, and lateral movement of the wetting front when homogeneous assumptions are made. For example, Δf can be obtained from coaxial graph, Figure 4, or can be computed from Equation 121, for any known soil (i.e., the magnitude of soil parameters and their variation are known).

Thus

$$f_{hetero} = f_{homo} - \Delta f_{hetero} \quad . \quad . \quad . \quad . \quad . \quad [124]$$

Because of the following assumptions, caution should be exercised in using the coaxial graphs.

1. The regression equation used in developing these graphs assumes no interaction of the soil parameters.

2. The problems that have been solved and compared herein are based on a single soil parameter, varying in a given case.

A major objective of this study is to determine the effects of more than one soil hydraulic. This objective is met be comparing the solutions with two or more parameters varying with the results given in the coaxial graphs. For some of the solutions, the comparison between the calculated values and the values read from the coaxial graphs shows minor to insignificant interaction and additive law of effect can be applied. In many other cases this is not true.

For example in Table 8, the interaction column shows there is a minor to insignificant interaction between λ' (when a prime occurs with soil parameter symbol it indicates that the value of soil parameter, in this case pore size distribution exponent, increases with depth, otherwise its value decreases with depth) and η (porosity decreasing with depth). Thus for λ and λ' the additive law of effect does apply. To see this in more detail, at a depth z = 1.2 the degree of saturation for homogeneous soil S_1 = 0.6799. For the case in which pore size distribution exponent is increasing with depth (0.7 to 1.3) S_7 = 0.6708, and the case in which porosity decreasing with depth (0.62 to 0.18) is S_5 = 0.6713 (subscripts are the problem numbers as shown in Table 1). The change in the degree of saturations in these two cases is 0.0177 ($S_7 - S_1 + S_7 - S_5$ = 0.0177). In Problem No. 19 the two soil parameters are varying simultaneously. The degree of saturation at depth 1.2 is S_{19} = 0.6620 which is about 0.0177 less than the homogeneous soil. Thus the additive law of effect can be applied here.

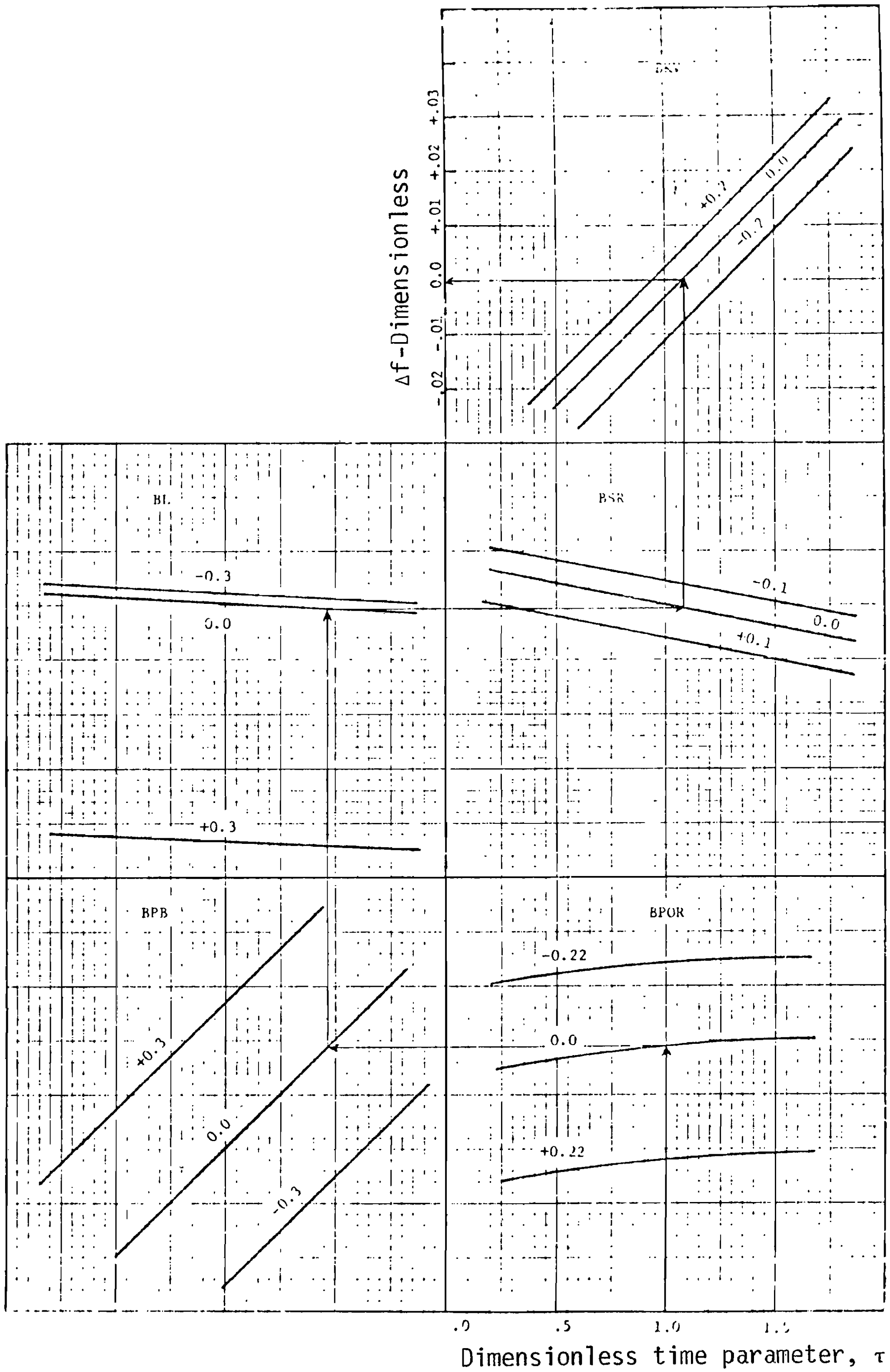

Figure 4. Graphical solution giving the difference between the instantaneous infiltration rate for homogeneous and heterogeneous soil, Δf; based upon linear coefficients which describe heterogeneity as a function of depth.

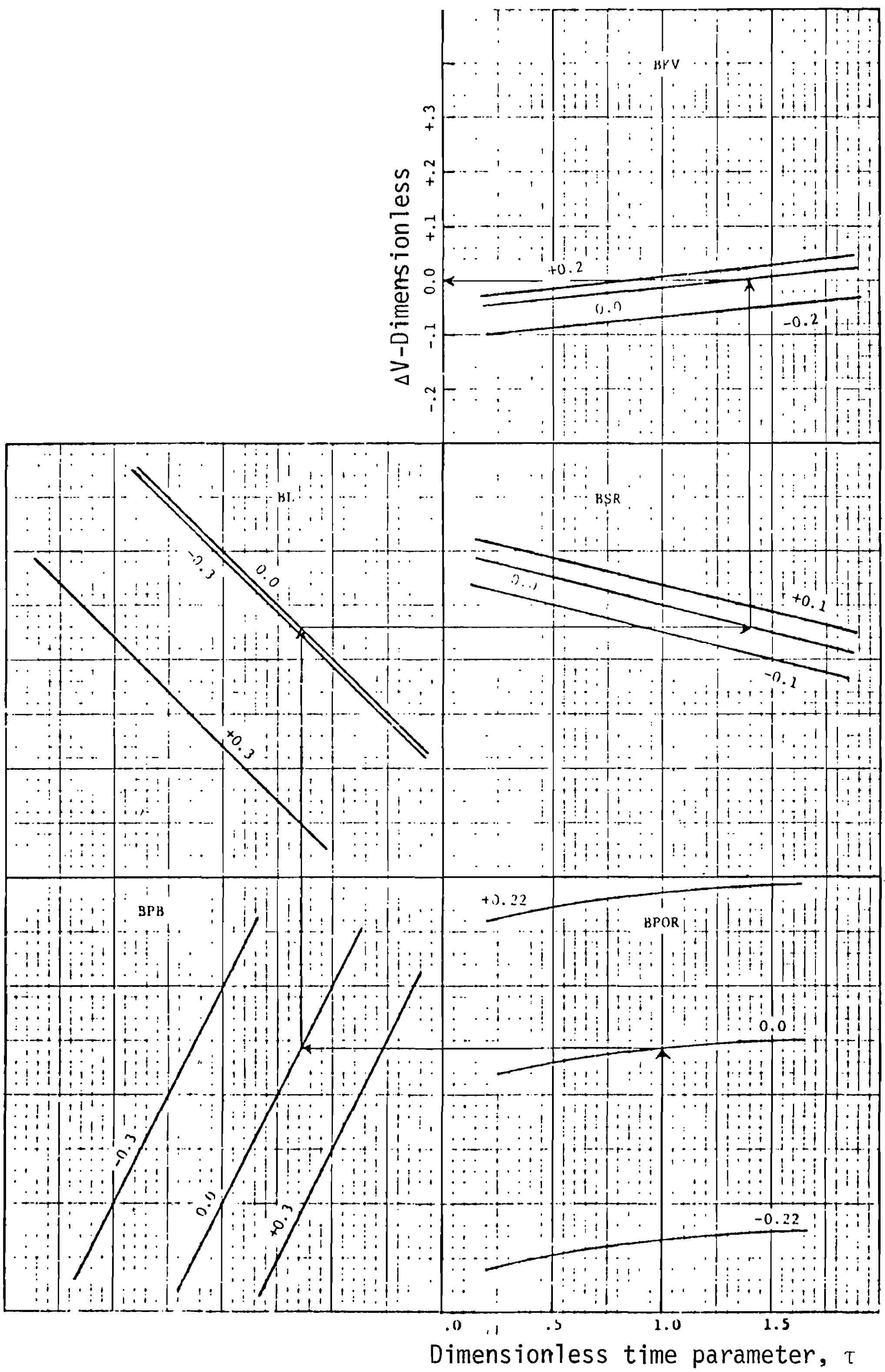

Figure 5. Graphical solution giving the difference between the vertical penetration of wetting front for homogeneous and heterogeneous soil, ΔV. Based upon linear coefficients which describe heterogeneity as a function of depth.

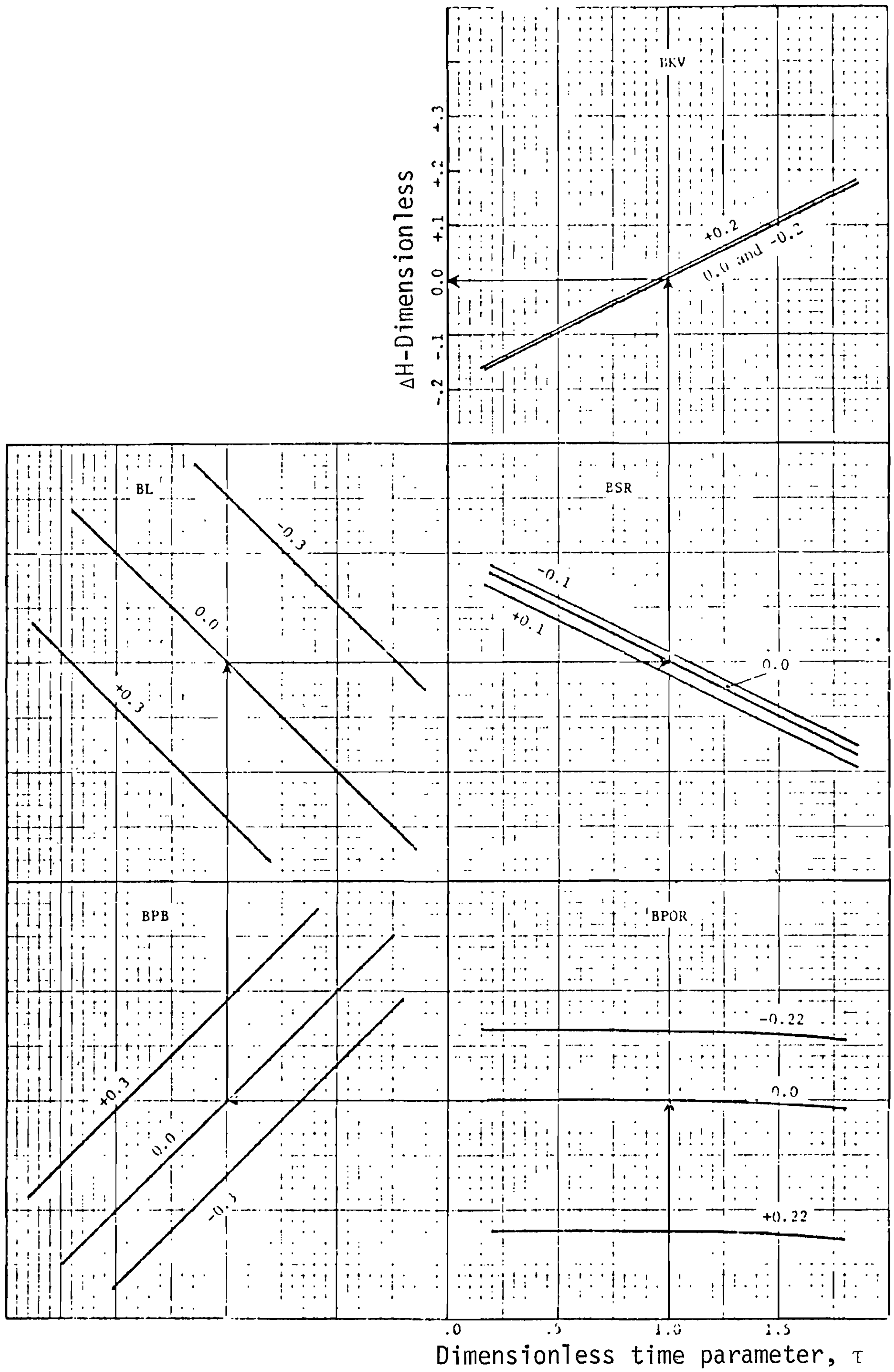

Figure 6. Graphical solution giving the difference between the lateral movement of wetting front for homogeneous and heterogeneous soil, ΔH. Based upon linear coefficients which describe heterogeneity as a function of depth.

CONCLUSIONS

1. Heterogeneity of the soil due to variation of soil hydraulic properties along the soil profile has significant effect on all infiltration characteristics.

2. There is minor to insignificant interaction between the soil parameters. No interaction effect exists for vertical penetration and horizontal movement of wetting front.

3. The additive law of effect can be applied in using coaxial graphs. That is coaxial graphs provide reasonably accurate estimates for more than one soil parameter variation at a time.

4. The difference in solution feature between the solution obtained by considering the variation of a soil parameter and the solution of the homogeneous soil are consistent in sign. This indicates that the magnitudes of soil parameters of upper part of the soil profile has a determining effect on the solution of the problem.

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APPENDIX I

TABLE 2.--Disbribution of Saturation and Existing Difference Between Homogeneous and Heterogeneous Soils Along the Axis of Symmetry at Dimensionless Time τ = 1.88.

Parameter Varied	None	λ		P_b		S_r		n		K_v	
Z	S_1	S_2	S_2-S_1	S_3	S_3-S_1	S_4	S_4-S_1	S_5	S_5-S_1	S_6	S_6-S_1
2,000	0,9000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000
1,800	0,8407	0,7623	-0,0784	0,8319	-0,0088	0,8442	0,0035	0,8397	-0,0010	0,8460	0,0053
1,600	0,7801	0,6646	-0,1155	0,7657	-0,0144	0,7846	0,0045	0,7775	-0,0026	0,7900	0,0099
1,400	0,7276	0,5968	-0,1308	0,7076	-0,0200	0,7296	0,0020	0,7224	-0,0052	0,7411	0,0135
1,200	0,6799	0,6391	-0,0408	0,6526	-0,0273	0,6664	-0,0135	0,6713	-0,0086	0,6955	0,0156
1,000	0,6313	0,4774	-0,1539	0,5932	-0,0381	0,6195	-0,0118	0,6189	-0,0124	0,6463	0,0150
0,800	0,5746	0,3939	-0,1807	0,5190	-0,0556	0,5507	-0,0239	0,5584	-0,0162	0,5838	0,0092
0,600	0,4977	0,2905	-0,2072	0,4036	-0,0941	0,4544	-0,0433	0,4791	-0,0186	0,4877	-0,0100
0,400	0,3615	0,2986	-0,0629	0,2356	-0,1259	0,2745	-0,0870	0,3487	-0,0128	0,2854	-0,0761
0,200	0,2546	0,3218	0,0672	0,2288	-0,0258	0,1837	-0,0709	0,2551	0,0005	0,2537	-0,0009
0,000	0,2563	0,3483	0,0920	0,2244	-0,0319	0,1688	-0,0875	0,2563	0,0000	0,2563	0,0000

TABLE 2.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		n'		K_v'	
Z	S_1	S_7	S_7-S_1	S_8	S_8-S_1	S_9	S_9-S_1	S_{10}	S_{10}-S_1	S_{11}	S_{11}-S_1
2,000	0,9000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000	0,9000	0,0000
1,800	0,8407	0,8413	0,0006	0,8530	0,0123	0,8366	-0,0041	0,8415	0,0008	0,8356	-0,0049
1,600	0,7801	0,7798	-0,0003	0,7984	0,0183	0,7746	-0,0055	0,7824	0,0023	0,7715	-0,0086
1,400	0,7276	0,7239	-0,0037	0,7493	0,0217	0,7240	-0,0036	0,7322	0,0046	0,7163	-0,0113
1,200	0,6799	0,6708	-0,0091	0,7055	0,0256	0,6811	0,0012	0,6874	0,0075	0,6672	-0,0127
1,000	0,6313	0,6152	-0,0161	0,6637	0,0324	0,6400	0,0087	0,6423	0,0110	0,6192	-0,0121
0,800	0,5746	0,5484	-0,0262	0,6191	0,0445	0,5942	0,0196	0,5897	0,0151	0,5666	-0,0080
0,600	0,4977	0,4515	-0,0462	0,5660	0,0683	0,5346	0,0369	0,5175	0,0198	0,5007	0,0030
0,400	0,3615	0,2482	-0,1133	0,5955	0,2340	0,4352	0,0737	0,3874	0,0259	0,4032	0,0417
0,200	0,2546	0,2126	-0,0420	0,3833	0,1287	0,3265	0,0719	0,2550	0,0004	0,2636	0,0090
0,000	0,2563	0,2069	-0,0494	0,2986	0,0423	0,3438	0,0875	0,2563	0,0000	0,2563	0,0000

TABLE 3.--Distribution of Capillary Pressure and Existing Difference Between Homogeneous and Heterogeneous Soils Along the Axis of Symmetry at Dimensionless Time τ = 1.88.

Parameter Varied	None	λ		P_b		S_r		n		K_v	
Z	P_{c_1}	P_{c_2}	$P_{c_2}-P_{c_1}$	P_{c_3}	$P_{c_3}-P_{c_1}$	P_{c_4}	$P_{c_4}-P_{c_1}$	P_{c_5}	$P_{c_5}-P_{c_1}$	P_{c_6}	$P_{c_6}-P_{c_1}$
2,000	1,1333	1.1011	-0,0322	1.4733	0,3400	1.1538	0,0205	1,1333	0,0000	1,1333	0,0000
1,800	1,2307	1,3029	0.0722	1.5458	0,3151	1,2537	0,0230	1,2324	0,0017	1.2213	-0,0094
1,600	1.3489	1,5300	0,1811	1.6291	0,2802	1,3749	0,0260	1,3547	0,0058	1.3280	-0,0209
1,400	1.4716	1,7758	0,3042	1,7073	0,2357	1,5011	0,0295	1,4850	0,0134	1,4379	-0,0337
1,200	1.6042	2.0899	0.4857	1,7928	0,1886	1,6389	0,0347	1,6305	0,0263	1,5582	-0,0460
1,000	1,7662	2,5964	0,8302	1.9177	0.1515	1,8104	0,0442	1,8128	0,0466	1.7127	-0,0535
0,800	2,0017	3,7737	1.7720	2.1654	0.1637	2,0681	0,0664	2,0180	0,0163	1,9595	-0,0422
0,600	2,4445	7,7304	5,2859	2,9495	0,5050	2,5641	0,1396	2,5831	0,1386	2,5173	0,0728
0,400	4,0195	8,3904	4,3709	8,1294	4,1099	4,9320	0,9125	4,2784	0,2589	6,2792	2,2597
0,200	8,1231	8,2000	0,0769	8,1999	0,0768	8,1779	0,0548	8,0838	-0,0393	8,1973	0,0742
0,000	7,9998	8,0000	0,0002	8,0000	0,0002	8,0000	0,0002	7,9990	-0,0008	8,0000	0,0002

TABLE 3.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		n'		K_v'	
Z	P_{c_1}	P_{c_7}	$P_{c_7}-P_{c_1}$	P_{c_8}	$P_{c_8}-P_{c_1}$	P_{c_9}	$P_{c_9}-P_{c_1}$	$P_{c_{10}}$	$P_{c_{10}}-P_{c_1}$	$P_{c_{11}}$	$P_{c_{11}}-P_{c_1}$
2,000	1,1333	1,1958	0,0625	0,7933	-0,3400	1,1176	-0,0157	1,1333	0,0000	1,1333	0,0000
1,800	1,2307	1,3126	0,0819	0,9190	-0,3117	1,2131	-0,0176	1,2293	-0,0014	1,2393	0,0086
1,600	1,3489	1,4415	0,0926	1,0750	-0,2739	1,3292	-0,0197	1,3440	-0,0049	1,3677	0,0188
1,400	1,4716	1,5626	0,0910	1,2482	-0,2234	1,4495	-0,0221	1,4601	-0,0115	1,5010	0,0294
1,200	1,6042	1,6836	0,0794	1,4383	-0,1659	1,5788	-0,0254	1,5818	-0,0224	1,6434	0,0392
1,000	1,7662	1,8270	0,0608	1,6548	-0,1114	1,7348	-0,0314	1,7266	-0,0395	1,8114	0,0452
0,800	2,0017	2,0439	0,0422	1,9205	-0,0812	1,9565	-0,0452	1,9333	-0,0684	2,0404	0,0387
0,600	2,4445	2,5226	0,0781	2,2883	-0,1562	2,3504	-0,0941	2,3128	-0,1317	2,4238	-0,0207
0,400	4,0195	6,2283	2,2088	2,9030	-1,1165	3,5087	-0,5108	3,5803	-0,4392	3,5603	-0,4392
0,200	8,1231	8,1992	0,0761	4,5168	-3,6063	7,9779	-0,1452	8,0970	-0,0261	8,0970	-0,0261
0,000	7,9998	8,0000	0,0002	7,4354	-0,5644	7,9992	-0,0006	7,9998	0,0000	7,9998	0,0000

TABLE 4.--Infiltration Rate and Existing Differences Between Homogeneous and Heterogeneous Soil at Different Time Steps.

Parameter Varied	None	λ		P_b		S_r		n		K_v	
τ	f_1	f_2	f_2-f_1	f_3	f_3-f_1	f_4	f_4-f_1	f_5	f_5-f_1	f_6	f_6-f_1
0,005	1,2217	2,2992	1,0775	1,2872	0,0655	1,0760	-0,1457	1,7572	0,5355	1,2201	-0,0016
0,020	0,7111	0,7878	0,0767	0,7876	0,0765	0,6407	-0,0704	0,8780	0,1669	0,7080	-0,0031
0,050	0,5553	0,4295	-0,1258	0,6195	0,0642	0,5049	-0,0504	0,6466	0,0913	0,5512	-0,0041
0,110	0,4734	0,2800	-0,1934	0,5264	0,0530	0,4338	-0,0396	0,5287	0,0553	0,4681	-0,0053
0,200	0,4321	0,2173	-0,2148	0,4765	0,0444	0,3973	-0,0348	0,4663	0,0362	0,4263	-0,0058
0,380	0,3992	0,1760	-0,2232	0,4353	0,0361	0,3685	-0,0307	0,4226	0,0234	0,3924	-0,0068
0,680	0,3818	0,1531	-0,2287	0,4102	0,0284	0,3531	-0,0287	0,3971	0,0153	0,3742	-0,0076
0,980	0,3783	0,1436	-0,2347	0,4004	0,0221	0,3499	-0,0284	0,3896	0,0113	0,3700	-0,0083
1,280	0,3774	0,1384	-0,2390	0,3947	0,0173	0,3490	-0,0284	0,3866	0,0092	0,3687	-0,0087
1,580	0,3771	0,1349	-0,2422	0,3909	0,0138	0,3487	-0,0284	0,3846	0,0075	0,3681	-0,0090
1,880	0,3771	0,1325	-0,2446	0,3880	0,0109	0,3487	-0,0284	0,3839	0,0068	0,3679	-0,0092

TABLE 4.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		n'		K_v'	
τ	f_1	f_7	$f_7-^+_1$	f_8	f_8-f_1	f_9	f_9-f_1	f_{10}	$f_{10}-f_{11}$	f_{11}	$f_{11}-f_1$
0,005	1,2217	1,6939	0,4722	1,1548	-0,0669	1,3646	0,1429	0,6493	-0,5724	1,2233	0,0016
0,020	0,7111	0,8997	0,1886	0,6171	-0,0940	0,7765	0,0654	0,4899	-0,2212	0,7141	0,0030
0,050	0,5553	0,6745	0,1192	0,4853	-0,0700	0,6011	0,0458	0,4415	-0,1138	0,5593	0,0040
0,110	0,4734	0,5582	0,0848	0,4184	-0,0550	0,5084	0,0350	0,4082	-0,0652	0,4787	0,0053
0,200	0,4321	0,4991	0,0670	0,3879	-0,0442	0,4628	0,0307	0,3899	-0,0422	0,4381	0,0060
0,380	0,3992	0,4535	0,0543	0,3640	-0,0352	0,4259	0,0267	0,3731	-0,0261	0,4062	0,0070
0,680	0,3818	0,4256	0,0438	0,3545	-0,0273	0,4064	0,0246	0,3656	-0,0162	0,3896	0,0078
0,980	0,3783	0,4137	0,0354	0,3545	-0,0238	0,4023	0,0240	0,3656	-0,0127	0,3866	0,0083
1,280	0,3774	0,4067	0,0293	0,3545	-0,0229	0,4013	0,0239	0,3656	-0,0118	0,3860	0,0086
1,580	0,3771	0,4019	0,0248	0,3545	-0,0226	0,4010	0,0239	0,3656	-0,0115	0,3860	0,0089
1,880	0,3771	0,3983	0,0212	0,3545	-0,0226	0,4010	0,0239	0,3656	-0,0115	0,3860	0,0089

TABLE 5.--Volume of Water Applied and Existing Difference Between Homogeneous and Heterogeneous Soil at Different Time Steps.

Parameter Varied	None	λ		P_b		S_r		n		K_v	
τ	W_1	W_2	W_2-W_1	W_3	W_3-W_1	W_4	W_4-W_1	W_5	W_5-W_1	W_6	W_6-W_1
0.005	0.0061	0.0114	0.0053	0.0064	0.0003	0.0053	-0.0008	0.0087	0.0026	0.0061	0.0000
0.020	0.0142	0.0157	0.0015	0.0157	0.0015	0.0128	-0.0014	0.0175	0.0033	0.0141	-0.0001
0.050	0.0277	0.0214	-0.0063	0.0309	0.0032	0.0252	-0.0025	0.0323	0.0046	0.0275	-0.0002
0.110	0.0520	0.0308	-0.0212	0.0579	0.0059	0.0477	-0.0043	0.0581	0.0061	0.0514	-0.0006
0.200	0.0864	0.0434	-0.0430	0.0953	0.0089	0.0794	-0.0070	0.0936	0.0072	0.0852	-0.0012
0.380	0.1517	0.0668	-0.0849	0.1654	0.0137	0.1400	-0.0117	0.1605	0.0088	0.1491	-0.0026
0.680	0.2596	0.1040	-0.1556	0.2789	0.0193	0.2400	-0.0196	0.2699	0.0103	0.2544	-0.0052
0.980	0.3707	0.1407	-0.2300	0.3924	0.0217	0.3428	-0.0279	0.3818	0.0111	0.3626	-0.0081
1.280	0.4830	0.1770	-0.3060	0.5052	0.0222	0.4467	-0.0363	0.4947	0.0117	0.4719	-0.0111
1.580	0.5957	0.2131	-0.3826	0.6175	0.0218	0.5509	-0.0448	0.6081	0.0124	0.5816	-0.0141
1.880	0.7089	0.2491	-0.4598	0.7295	0.0206	0.6554	-0.0535	0.7217	0.0128	0.6916	-0.0173

TABLE 5.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		n'		K_v'	
τ	W_1	W_7	W_7-W_1	W_8	W_8-W_1	W_9	W_9-W_1	W_{10}	$W_{10}-W_1$	W_{11}	$W_{11}-W_1$
0.005	0.0061	0.0084	0.0023	0.0057	-0.0004	0.0068	0.0007	0.0032	-0.0029	0.0061	0.0000
0.020	0.0142	0.0179	0.0037	0.0123	-0.0019	0.0155	0.0013	0.0097	-0.0045	0.0142	0.0000
0.050	0.0277	0.0337	0.0060	0.0242	-0.0035	0.0300	0.0023	0.0220	-0.0057	0.0279	0.0002
0.110	0.0520	0.0614	0.0094	0.0460	-0.0060	0.0559	0.0039	0.0449	-0.0071	0.0526	0.0006
0.200	0.0864	0.0998	0.0134	0.0775	-0.0089	0.0925	0.0061	0.0779	-0.0085	0.0876	0.0012
0.380	0.1517	0.1723	0.0206	0.1383	-0.0134	0.1618	0.0101	0.1417	-0.0100	0.1543	0.0026
0.680	0.2596	0.2893	0.0297	0.2410	-0.0186	0.2763	0.0167	0.2466	-0.0110	0.2649	0.0053
0.980	0.3707	0.4054	0.0347	0.3511	-0.0196	0.3942	0.0235	0.3591	-0.0116	0.3768	0.0081
1.280	0.4830	0.5205	0.0375	0.4645	-0.0185	0.5136	0.0306	0.4708	-0.0122	0.4941	0.0111
1.580	0.5957	0.6349	0.0392	0.5798	-0.0159	0.6335	0.0378	0.5832	-0.0125	0.6099	0.0142
1.880	0.7089	0.7488	0.0399	0.6961	-0.0128	0.7538	0.0449	0.6959	-0.0130	0.7260	0.0171

TABLE 6.--Horizontal Movement of Wetting Front and Existing Difference Between Homogeneous and Heterogeneous Soils at Different Time Steps.

Parameter Varied	None	λ		P_b		S_r		η		K_v	
τ	H_1	H_2	H_2-H_1	H_3	H_3-H_1	H_4	H_4-H_1	H_5	H_5-H_1	H_6	H_6-H_1
0,005	0,2000	0,3000	0,1000	0,3000	0,1000	0,2000	0,0000	0,2000	0,0000	0,2000	0,0000
0,020	0,3000	0,3000	0,0000	0,4000	0,1000	0,3000	0,0000	0,3000	0,0000	0,3000	0,0000
0,050	0,4000	0,4000	0,0000	0,5000	0,1000	0,4000	0,0000	0,4000	0,0000	0,4000	0,0000
0,110	0,5000	0,4000	-0,1000	0,6000	0,1000	0,5000	0,0000	0,5000	0,0000	0,5000	0,0000
0,200	0,6000	0,5000	-0,1000	0,7000	0,1000	0,6000	0,0000	0,5000	-0,1000	0,6000	0,0000
0,380	0,8000	0,6000	-0,2000	0,9000	0,1000	0,8000	0,0000	0,7000	-0,1000	0,8000	0,0000
0,680	1,0000	0,6000	-0,4000	1,2000	0,2000	1,0000	0,0000	0,8000	-0,2000	0,9000	-0,1000
0,980	1,1000	0,7000	-0,4000	1,4000	0,3000	1,1000	0,0000	0,9000	-0,2000	1,1000	0,3000
1,280	1,2000	0,8000	-0,4000	1,5000	0,3000	1,2000	0,0000	1,0000	-0,2000	1,2000	0,0000
1,580	1,3000	0,9000	-0,4000	1,6000	0,3000	1,3000	0,0000	1,1000	-0,2000	1,3000	0,0000
1,880	1,4000	0,9000	-0,5000	1,7000	0,3000	1,4000	0,0000	1,2000	-0,2000	1,4000	0,0000

TABLE 6.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		η'		K_v'	
τ	H_1	H_7	H_7-H_1	H_8	H_8-H_1	H_9	H_9-H_1	H_{10}	$H_{10}-H_1$	H_{11}	$H_{11}-H_1$
0,005	0,2000	0,3000	0,1000	0,2000	0,0000	0,2000	0,0000	0,3000	0,1000	0,2000	0,0000
0,020	0,3000	0,4000	0,1000	0,3000	0,0000	0,3000	0,0000	0,4000	0,1000	0,3000	0,0000
0,050	0,4000	0,5000	0,1000	0,4000	0,0000	0,4000	0,0000	0,5000	0,1000	0,4000	0,0000
0,110	0,5000	0,7000	0,2000	0,4000	-0,1000	0,5000	0,0000	0,7000	0,2000	0,5000	0,0000
0,200	0,6000	0,8000	0,2000	0,5000	-0,1000	0,6000	0,0000	0,8000	0,2000	0,6000	0,0000
0,380	0,8000	1,0000	0,2000	0,6000	-0,2000	0,8000	0,0000	1,0000	0,2000	0,8000	0,0000
0,680	1,0000	1,3000	0,3000	0,8000	-0,2000	0,9000	-0,1000	1,2000	0,2000	1,0000	0,0000
0,980	1,1000	1,5000	0,4000	0,9000	-0,2000	1,1000	0,0000	1,4000	0,3000	1,1000	0,0000
1,280	1,2000	1,6000	0,4000	0,9000	-0,3000	1,2000	0,0000	1,5000	0,3000	1,2000	0,0000
1,580	1,3000	1,8000	0,5000	1,0000	-0,3000	1,3000	0,0000	1,6000	0,3000	1,3000	0,0000
1,880	1,4000	1,9000	0,5000	1,1000	-0,3000	1,3000	-0,1000	1,8000	0,4000	1,4000	0,0000

TABLE 7.--Vertical Penetration of Wetting Front and Existing Difference Between Homogeneous and Heterogeneous Soils at Different Time Steps.

Parameter Varied	None	λ		P_b		S_r		η		K_v	
τ	V_1	V_2	V_2-V_1	V_3	V_3-V_1	V_4	V_4-V_1	V_5	V_5-V_1	V_6	V_6-V_1
0.005	0.2000	0.3000	0.1000	0.3000	0.1000	0.2000	0.0000	0.2000	0.0000	0.2000	0.0000
0.020	0.3000	0.4000	0.1000	0.4000	0.1000	0.3000	0.0000	0.3000	0.0000	0.3000	0.0000
0.050	0.5000	0.5000	0.0000	0.5000	0.0000	0.5000	0.0000	0.4000	-0.1000	0.5000	0.0000
0.110	0.6000	0.6000	0.0000	0.7000	0.1000	0.7000	0.1000	0.6000	0.0000	0.6000	0.0000
0.200	0.8000	0.8000	0.0000	0.9000	0.1000	0.8000	0.0000	0.7000	-0.1000	0.8000	0.0000
0.380	1.1000	0.9000	-0.2000	1.1000	0.0000	1.1000	0.0000	0.9000	-0.2000	1.0000	-0.1000
0.680	1.3000	1.2000	-0.1000	1.3000	0.0000	1.3000	0.0000	1.2000	-0.1000	1.3000	0.0000
0.980	1.5000	1.3000	-0.2000	1.4000	-0.1000	1.5000	0.0000	1.4000	-0.1000	1.4000	-0.1000
1.280	1.7000	1.5000	-0.2000	1.6000	-0.1000	1.7000	0.0000	1.6000	-0.1000	1.6000	-0.1000
1.580	1.8000	1.6000	-0.2000	1.7000	-0.1000	1.8000	0.0000	1.8000	0.0000	1.7000	-0.1000
1.680	2.0000	1.7000	-0.3000	1.8000	-0.2000	1.9000	-0.1000	2.0000	0.0000	1.9000	-0.1000

TABLE 7.--Continued.

Parameter Varied	None	λ'		P_b'		S_r'		η'		K_v'	
τ	V_1	V_7	V_7-V_1	V_8	V_8-V_1	V_9	V_9-V_1	V_{10}	$V_{10}-V_1$	V_{11}	$V_{11}-V_1$
0.005	0.2000	0.3000	0.1000	0.2000	0.0000	0.2000	0.0000	0.3000	0.1000	0.2000	0.0000
0.020	0.3000	0.4000	0.1000	0.3000	0.0000	0.3000	0.0000	0.4000	0.1000	0.3000	0.0000
0.050	0.5000	0.6000	0.1000	0.4000	-0.1000	0.5000	0.0000	0.6000	0.1000	0.5000	0.0000
0.110	0.6000	0.7000	0.1000	0.6000	0.0000	0.7000	0.1000	0.8000	0.2000	0.7000	0.1000
0.200	0.8000	0.9000	0.1000	0.8000	0.0000	0.8000	0.0000	0.9000	0.1000	0.8000	0.0000
0.380	1.1000	1.1000	0.0000	1.1000	0.0000	1.0000	-0.1000	1.2000	0.1000	1.1000	0.0000
0.680	1.3000	1.3000	0.0000	1.4000	0.1000	1.3000	0.0000	1.4000	0.1000	1.3000	0.0000
0.980	1.5000	1.5000	0.0000	1.6000	0.1000	1.5000	0.0000	1.6000	0.1000	1.6000	0.1000
1.280	1.7000	1.6000	-0.1000	1.9000	0.2000	1.7000	0.0000	1.7000	0.0000	1.7000	0.0000
1.580	1.8000	1.7000	-0.1000	2.0000	0.2000	1.9000	0.1000	1.8000	0.0000	1.9000	0.1000
1.880	2.0000	1.8000	-0.2000	2.0000	0.0000	2.0000	0.0000	2.0000	0.0000	2.0000	0.0000

TABLE 8.--Distribution of Saturation, Main Effect and Interactive Effect Along the Axis of Symmetry at the Dimensionless Time τ = 1.88.

Parameter Varied	None	λ	P_b	λ & P_b			
Z	S_1	S_2	S_3	S_{12}	Effect of λ	Effect of P_b	Interaction
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.7623	0.8319	0.8281	-0.0411	0.0285	0.0373
1.6	0.7801	0.6646	0.7657	0.7605	-0.0603	0.0408	0.0551
1.4	0.7276	0.5968	0.7076	0.7040	-0.0672	0.0436	0.0636
1.2	0.6799	0.6391	0.6526	0.6531	-0.0202	-0.0067	0.0206
1.0	0.6313	0.4774	0.5932	0.6011	-0.0730	0.0428	0.0809
0.8	0.5746	0.3939	0.5190	0.5403	-0.0797	0.0454	0.1010
0.6	0.4977	0.2905	0.4036	0.4541	-0.0784	0.0348	0.1289
0.4	0.3615	0.2986	0.2356	0.3053	0.0034	-0.0596	0.0663
0.2	0.2546	0.3218	0.2288	0.2896	0.0640	-0.0290	-0.0032
0.0	0.2563	0.3483	0.2244	0.3045	0.0861	-0.0378	-0.0059

TABLE 8.--Continued

Parameter Varied	None	λ	S_r'	λ & S_r'			
Z	S_1	S_2	S_9	S_{16}	Effect of λ	Effect of S_r'	Interaction
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.7623	0.8366	0.7492	-0.0829	-0.0086	-0.0045
1.6	0.7801	0.6646	0.7746	0.6482	-0.1210	-0.0109	-0.0055
1.4	0.7276	0.5968	0.7240	0.5835	-0.1356	-0.0084	-0.0049
1.2	0.6799	0.6391	0.6811	0.5329	-0.0945	-0.0525	-0.0537
1.0	0.6313	0.4774	0.6400	0.4814	-0.1563	0.0064	-0.0024
0.8	0.5746	0.3939	0.5942	0.4128	-0.1811	0.0193	-0.0003
0.6	0.4977	0.2905	0.5346	0.3264	-0.2077	0.0364	-0.0005
0.4	0.3615	0.2986	0.4352	0.3181	-0.0900	0.0466	-0.0271
0.2	0.2546	0.3218	0.3265	0.3856	0.0632	0.0678	-0.0040
0.0	0.2563	0.3483	0.3438	0.4249	0.0866	0.0821	-0.0055

TABLE 8.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
Z	S_1	S_7	S_3	S_{13}	Effect of λ'	Effect of P_b	Interaction
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8413	0.8319	0.8347	0.0017	-0.0077	0.0011
1.6	0.7801	0.7798	0.7657	0.7675	0.0008	-0.0134	0.0010
1.4	0.7276	0.7239	0.7076	0.7048	-0.0032	-0.0196	0.0004
1.2	0.6799	0.6708	0.6526	0.6425	-0.0096	-0.0278	-0.0005
1.0	0.6313	0.6152	0.5932	0.5737	-0.0178	-0.0398	-0.0017
0.8	0.5746	0.5464	0.5190	0.4856	-0.0298	-0.0592	-0.0036
0.6	0.4977	0.4515	0.4036	0.3207	-0.0646	-0.1124	-0.0183
0.4	0.3615	0.2482	0.2356	0.2047	-0.0721	-0.0847	0.0412
0.2	0.2546	0.2126	0.2288	0.1945	-0.0382	-0.0220	0.0038
0.0	0.2563	0.2069	0.2244	0.1858	-0.0440	-0.0265	0.0054

TABLE 8.--Continued

Parameter Varied	None	λ	S_r	λ & S_r			
Z	S_1	S_2	S_4	S_{15}	Effect of λ	Effect of S_r	Interaction
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.7623	0.8442	0.7746	-0.0740	0.0079	0.0044
1.6	0.7801	0.6646	0.7846	0.6796	-0.1101	0.0099	0.0053
1.4	0.7276	0.5968	0.7296	0.6083	-0.1260	0.0068	0.0047
1.2	0.6799	0.6391	0.6664	0.5433	-0.0819	-0.0547	-0.0412
1.0	0.6313	0.4774	0.6195	0.4707	-0.1514	-0.0092	0.0025
0.8	0.5746	0.3939	0.5507	0.3711	-0.1802	-0.0233	0.0006
0.6	0.4977	0.2905	0.4544	0.2536	-0.2040	-0.0401	0.0032
0.4	0.3615	0.2986	0.2745	0.2490	-0.0442	-0.0683	0.0187
0.2	0.2546	0.3218	0.1837	0.2579	0.0707	-0.0674	0.0035
0.0	0.2563	0.3483	0.1688	0.2716	0.0974	-0.0821	0.0054

TABLE 8.--Continued.

Parameter Varied	None	λ'	S_r	λ' & S_r			
Z	S_1	S_7	S_4	S_{17}	Effect of λ'	Effect of S_r	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8413	0.8442	0.8441	0.0003	0.0031	-0.0004
1.6	0.7801	0.7798	0.7846	0.7831	-0.0009	0.0039	-0.0006
1.4	0.7276	0.7239	0.7296	0.7244	-0.0044	0.0012	-0.0008
1.2	0.6799	0.6708	0.6664	0.6654	-0.0050	-0.0094	0.0041
1.0	0.6313	0.6152	0.6195	0.6004	-0.0176	-0.0133	-0.0015
0.8	0.5746	0.5464	0.5507	0.5194	-0.0287	-0.0265	-0.0026
0.6	0.4977	0.4515	0.4544	0.3974	-0.0516	-0.0487	-0.0054
0.4	0.3615	0.2482	0.2745	0.1726	-0.1076	-0.0813	0.0057
0.2	0.2546	0.2126	0.1837	0.1384	-0.0436	-0.0726	-0.0017
0.0	0.2563	0.2069	0.1688	0.1136	-0.0523	-0.0904	-0.0029

TABLE 8.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
Z	S_1	S_7	S_9	S_{18}	Effect of λ'	Effect of S_r'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8413	0.8366	0.8378	0.0009	-0.0038	0.0003
1.6	0.7801	0.7798	0.7746	0.7753	0.0002	-0.0050	0.0005
1.4	0.7276	0.7239	0.7240	0.7216	-0.0030	-0.0030	0.0007
1.2	0.6799	0.6708	0.6811	0.6738	-0.0082	0.0021	0.0009
1.0	0.6313	0.6152	0.6400	0.6266	-0.0147	0.0100	0.0013
0.8	0.5746	0.5484	0.5942	0.5723	-0.0241	0.0217	0.0021
0.6	0.4977	0.4515	0.5346	0.4971	-0.0419	0.0413	0.0044
0.4	0.3615	0.2482	0.4352	0.3341	-0.1072	0.0798	0.0061
0.2	0.2546	0.2126	0.3265	0.2867	-0.0409	0.0730	0.0011
0.0	0.2563	0.2069	0.3438	0.3002	-0.0465	0.0904	0.0029

TABLE 8.--Continued.

Parameter Varied	None	λ'	η	λ' & η			
Z	S_1	S_7	S_5	S_{19}	Effect of λ'	Effect of η	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8413	0.8397	0.8402	0.0006	-0.0010	-0.0000
1.6	0.7601	0.7798	0.7775	0.7768	-0.0005	-0.0028	-0.0002
1.4	0.7276	0.7239	0.7224	0.7183	-0.0039	-0.0054	-0.0002
1.2	0.6799	0.6706	0.6713	0.6620	-0.0092	-0.0087	-0.0001
1.0	0.6313	0.6152	0.6189	0.6025	-0.0162	-0.0125	-0.0002
0.8	0.5746	0.5464	0.5584	0.5318	-0.0264	-0.0164	-0.0002
0.6	0.4977	0.4515	0.4791	0.4324	-0.0465	-0.0188	-0.0003
0.4	0.3615	0.2482	0.3487	0.2430	-0.1095	-0.0090	0.0038
0.2	0.2546	0.2126	0.2551	0.2126	-0.0422	0.0003	-0.0003
0.0	0.2563	0.2069	0.2563	0.2069	-0.0494	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	λ	K_v	λ & K_v			
Z	S_1	S_2	S_6	S_{20}	Effect of λ	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.7623	0.8460	0.7668	-0.0788	0.0049	-0.0004
1.6	0.7801	0.6646	0.7900	0.6723	-0.1166	0.0088	-0.0011
1.4	0.7276	0.5968	0.7411	0.6061	-0.1329	0.0114	-0.0021
1.2	0.6799	0.6391	0.6955	0.5475	-0.0944	-0.0380	-0.0536
1.0	0.6313	0.4774	0.6463	0.4796	-0.1602	0.0087	-0.0063
0.8	0.5746	0.3939	0.5838	0.3736	-0.1955	-0.0055	-0.0147
0.6	0.4977	0.2905	0.4877	0.2807	-0.2071	-0.0099	0.0001
0.4	0.3615	0.2986	0.2854	0.2984	-0.0250	-0.0382	0.0379
0.2	0.2546	0.3218	0.2537	0.3218	0.0677	-0.0005	0.0005
0.0	0.2563	0.3483	0.2563	0.3483	0.0920	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
Z	S_1	S_2	S_{11}	S_{21}	Effect of λ	Effect of K_v'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.7623	0.8358	0.7581	-0.0781	-0.0046	0.0003
1.6	0.7801	0.6646	0.7715	0.6578	-0.1146	-0.0077	0.0009
1.4	0.7276	0.5968	0.7163	0.5888	-0.1292	-0.0097	0.0017
1.2	0.6799	0.6391	0.6672	0.5320	-0.0880	-0.0599	-0.0472
1.0	0.6313	0.4774	0.6192	0.4748	-0.1491	-0.0073	0.0047
0.8	0.5746	0.3939	0.5666	0.4043	-0.1715	0.0012	0.0092
0.6	0.4977	0.2905	0.5007	0.3096	-0.1992	0.0111	0.0081
0.4	0.3615	0.2986	0.4032	0.2992	-0.0835	0.0211	-0.0206
0.2	0.2546	0.3218	0.2636	0.3218	0.0627	0.0045	-0.0045
0.0	0.2563	0.3483	0.2563	0.3483	0.0920	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	P_b	S_r'	P_b & S_r'			
Z	S_1	S_3	S_4	S_{25}	Effect of P_b	Effect of S_r'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8319	0.8366	0.8266	-0.0093	-0.0046	-0.0005
1.6	0.7801	0.7657	0.7746	0.7589	-0.0150	-0.0061	-0.0007
1.4	0.7276	0.7076	0.7240	0.7029	-0.0206	-0.0041	-0.0005
1.2	0.6799	0.6526	0.6811	0.6529	-0.0277	0.0008	-0.0005
1.0	0.6313	0.5932	0.6400	0.6019	-0.0381	0.0087	-0.0000
0.8	0.5746	0.5190	0.5942	0.5407	-0.0546	0.0206	0.0010
0.6	0.4977	0.4036	0.5346	0.4475	-0.0906	0.0404	0.0035
0.4	0.3615	0.2356	0.4352	0.2927	-0.1342	0.0654	-0.0083
0.2	0.2546	0.2288	0.3265	0.3014	-0.0254	0.0722	0.0004
0.0	0.2563	0.2244	0.3438	0.3156	-0.0301	0.0894	0.0018

TABLE 8.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
Z	S_1	S_7	S_6	S_{22}	Effect of λ'	Effect of K_v	Inter action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8413	0.8460	0.8456	0.0001	0.0048	-0.0005
1.6	0.7801	0.7798	0.7900	0.7881	-0.0011	0.0091	-0.0008
1.4	0.7276	0.7239	0.7411	0.7354	-0.0047	0.0125	-0.0010
1.2	0.6799	0.6708	0.6955	0.6841	-0.0102	0.0145	-0.0011
1.0	0.6313	0.6152	0.6463	0.6275	-0.0174	0.0137	-0.0014
0.8	0.5746	0.5484	0.5838	0.5537	-0.0281	0.0073	-0.0020
0.6	0.4977	0.4515	0.4877	0.4317	-0.0511	-0.0149	-0.0049
0.4	0.3615	0.2482	0.2854	0.2216	-0.0886	-0.0514	0.0248
0.2	0.2546	0.2126	0.2537	0.2126	-0.0415	-0.0005	0.0005
0.0	0.2563	0.2069	0.2563	0.2069	-0.0494	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
Z	S_1	S_8	S_4	S_{26}	Effect of P_b'	Effect of S_r	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8530	0.8442	0.8551	0.0116	0.0028	-0.0007
1.6	0.7801	0.7984	0.7846	0.8012	0.0175	0.0037	-0.0008
1.4	0.7276	0.7493	0.7296	0.7500	0.0210	0.0014	-0.0007
1.2	0.6799	0.7055	0.6664	0.7015	0.0304	-0.0088	0.0048
1.0	0.6313	0.6637	0.6195	0.6522	0.0326	-0.0116	0.0001
0.8	0.5746	0.6191	0.5507	0.5972	0.0455	-0.0229	0.0010
0.6	0.4977	0.5660	0.4544	0.5296	0.0718	-0.0399	0.0034
0.4	0.3615	0.5955	0.2745	0.4349	0.1972	-0.1238	-0.0368
0.2	0.2546	0.3833	0.1837	0.2109	0.0780	-0.1217	-0.0507
0.0	0.2563	0.2986	0.1688	0.2044	0.0390	-0.0908	-0.0033

TABLE 8.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
Z	S_1	S_8	S_9	S_{27}	Effect of P_b'	Effect of S_r'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8530	0.8366	0.8503	0.0130	-0.0034	0.0007
1.6	0.7801	0.7984	0.7746	0.7945	0.0191	-0.0047	0.0008
1.4	0.7276	0.7493	0.7240	0.7470	0.0223	-0.0030	0.0007
1.2	0.6799	0.7055	0.6811	0.7076	0.0261	0.0017	0.0005
1.0	0.6313	0.6637	0.6400	0.6724	0.0324	0.0087	-0.0000
0.8	0.5746	0.6191	0.5942	0.6373	0.0438	0.0189	-0.0007
0.6	0.4977	0.5660	0.5346	0.5979	0.0658	0.0344	-0.0025
0.4	0.3615	0.5955	0.4352	0.5472	0.1730	0.0127	-0.0610
0.2	0.2546	0.3833	0.3265	0.4718	0.1370	0.0802	0.0083
0.0	0.2563	0.2986	0.3438	0.4020	0.0503	0.0955	0.0079

TABLE 8.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
Z	S_1	S_3	S_5	S_{28}	Effect of P_b	Effect of η	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8319	0.8397	0.8302	-0.0091	-0.0013	-0.0004
1.6	0.7801	0.7657	0.7775	0.7615	-0.0152	-0.0034	-0.0006
1.4	0.7276	0.7076	0.7224	0.7002	-0.0211	-0.0063	-0.0011
1.2	0.6799	0.6526	0.6713	0.6413	-0.0286	-0.0099	-0.0014
1.0	0.6313	0.5932	0.6189	0.5775	-0.0397	-0.0140	-0.0017
0.8	0.5746	0.5190	0.5584	0.4984	-0.0578	-0.0184	-0.0022
0.6	0.4977	0.4036	0.4791	0.3757	-0.0988	-0.0232	-0.0046
0.4	0.3615	0.2356	0.3487	0.2348	-0.1199	-0.0068	0.0060
0.2	0.2546	0.2288	0.2551	0.2288	-0.0260	0.0003	-0.0003
0.0	0.2563	0.2244	0.2563	0.2444	-0.0219	0.0100	0.0100

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TABLE 8.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
Z	S_1	S_3	S_{10}	S_{29}	Effect of P_b	Effect of η'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8319	0.8415	0.8334	-0.0085	0.0012	0.0004
1.6	0.7801	0.7657	0.7824	0.7697	-0.0135	0.0032	0.0009
1.4	0.7276	0.7076	0.7322	0.7148	-0.0167	0.0059	0.0013
1.2	0.6799	0.6526	0.6874	0.6635	-0.0256	0.0092	0.0017
1.0	0.6313	0.5932	0.6423	0.6[illegible]67	-0.0358	0.0133	0.0023
0.8	0.5746	0.5190	0.5897	0.5308	-0.0528	0.0180	0.0029
0.6	0.4977	0.4036	0.5175	0.4321	-0.0898	0.0242	0.0044
0.4	0.3615	0.2356	0.3874	0.2390	-0.1372	0.0146	-0.0112
0.2	0.2546	0.2288	0.2550	0.2288	-0.0260	0.0002	-0.0002
0.0	0.2563	0.2244	0.2563	0.2244	-0.0319	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
Z	S_1	S_3	S_6	S_{30}	Effect of P_b	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8319	0.8460	0.8363	-0.0093	0.0049	-0.0004
1.6	0.7801	0.7657	0.7900	0.7736	-0.0154	0.0089	-0.0010
1.4	0.7276	0.7076	0.7411	0.7178	-0.0216	0.0118	-0.0016
1.2	0.6799	0.6526	0.6955	0.6633	-0.0297	0.0132	-0.0025
1.0	0.6313	0.5932	0.6463	0.7012	0.0084	0.0615	0.0465
0.8	0.5746	0.5190	0.5838	0.5168	-0.0613	0.0035	-0.0057
0.6	0.4977	0.4036	0.4877	0.3490	-0.1164	-0.0323	-0.0223
0.4	0.3615	0.2356	0.2854	0.2331	-0.0891	-0.0393	0.0368
0.2	0.2546	0.2288	0.2537	0.2288	-0.0253	-0.0005	0.0005
0.0	0.2563	0.2244	0.2563	0.2244	-0.0319	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
Z	S_1	S_7	S_{11}	S_{23}	Effect of λ'	Effect of K_v'	Inter-action
2.0	0,9000	0,9000	0,9000	0,9000	0,0000	0,0000	-0,0000
1.8	0,8407	0,8413	0,8358	0,8373	0,0010	-0,0045	0,0004
1.6	0,7801	0,7798	0,7715	0,7725	0,0003	-0,0080	0,0006
1.4	0,7276	0,7239	0,7163	0,7143	-0,0028	-0,0105	0,0009
1.2	0,6799	0,6708	0,6672	0,6602	-0,0080	-0,0116	0,0010
1.0	0,6313	0,6152	0,6192	0,6054	-0,0149	-0,0109	0,0011
0.8	0,5746	0,5484	0,5666	0,5432	-0,0248	-0,0066	0,0014
0.6	0,4977	0,4515	0,5007	0,4613	-0,0428	0,0064	0,0034
0.4	0,3615	0,2482	0,4032	0,3067	-0,1049	0,0501	0,0084
0.2	0,2546	0,2126	0,2636	0,2127	-0,0464	0,0045	-0,0045
0.0	0,2563	0,2069	0,2563	0,2069	-0,0494	0,0000	0,0000

TABLE 8.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
Z	S_1	S_3	S_4	S_{24}	Effect of P_b	Effect of S_r	Inter-action
2.0	0,9000	0,9000	0,9000	0,9000	0,0000	0,0000	-0,0000
1.8	0,8407	0,8319	0,8442	0,8363	-0,0084	0,0040	0,0005
1.6	0,7801	0,7657	0,7846	0,7713	-0,0139	0,0051	0,0005
1.4	0,7276	0,7076	0,7296	0,7107	-0,0194	0,0026	0,0005
1.2	0,6799	0,6526	0,6664	0,6499	-0,0219	-0,0081	0,0054
1.0	0,6313	0,5932	0,6195	0,5817	-0,0380	-0,0116	0,0001
0.8	0,5746	0,5190	0,5507	0,4936	-0,0563	-0,0247	-0,0008
0.6	0,4977	0,4036	0,4544	0,3497	-0,0994	-0,0486	-0,0053
0.4	0,3615	0,2356	0,2745	0,1799	-0,1103	-0,0714	0,0157
0.2	0,2546	0,2288	0,1837	0,1562	-0,0266	-0,0718	-0,0009
0.0	0,2563	0,2244	0,1688	0,1331	-0,0338	-0,0894	-0,0019

TABLE 8.--Continued.

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
Z	S_1	S_3	S_{11}	S_{31}	Effect of P_b	Effect of K_v'	Inter-action
2.0	0,9000	0,9000	0,9000	0,9000	0,0000	0,0000	-0,0000
1.8	0,8407	0,8319	0,8358	0,8278	-0,0084	-0,0045	0,0004
1.6	0,7801	0,7657	0,7715	0,7587	-0,0136	-0,0078	0,0008
1.4	0,7276	0,7076	0,7163	0,6990	-0,0186	-0,0099	0,0014
1.2	0,6799	0,6526	0,6672	0,6438	-0,0253	-0,0107	0,0020
1.0	0,6313	0,5932	0,6192	0,5868	-0,0353	-0,0093	0,0028
0.8	0,5746	0,5190	0,5666	0,5195	-0,0514	-0,0037	0,0042
0.6	0,4977	0,4036	0,5007	0,4244	-0,0852	0,0119	0,0089
0.4	0,3615	0,2356	0,4032	0,2513	-0,1389	0,0287	-0,0130
0.2	0,2546	0,2288	0,2636	0,2288	-0,0303	0,0045	-0,0045
0.0	0,2563	0,2244	0,2563	0,2244	-0,0319	0,0000	0,0000

TABLE 8.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
Z	S_1	S_8	S_{11}	S_{32}	Effect of P_b'	Effect of K_v'	Inter-action
2.0	0,9000	0,9000	0,9000	0,9000	0,0000	0,0000	-0,0000
1.8	0,8407	0,8530	0,8358	0,8475	0,0120	-0,0052	-0,0003
1.6	0,7801	0,7984	0,7715	0,7883	0,0175	-0,0093	-0,0008
1.4	0,7276	0,7493	0,7163	0,7358	0,0206	-0,0124	-0,0011
1.2	0,6799	0,7055	0,6672	0,7900	0,0742	0,0359	0,0486
1.0	0,6313	0,6637	0,6192	0,6491	0,0312	-0,0133	-0,0013
0.8	0,5746	0,6191	0,5666	0,6121	0,0450	-0,0075	0,0005
0.6	0,4977	0,5660	0,5007	0,5900	0,0788	0,0135	0,0105
0.4	0,3615	0,5955	0,4032	0,5507	0,1908	-0,0015	-0,0432
0.2	0,2546	0,3833	0,2636	0,5220	0,1936	0,0739	0,0649
0.0	0,2563	0,2986	0,2563	0,4651	0,1256	0,0833	0,0833

TABLE 8.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
Z	S_1	S_4	S_5	S_{33}	Effect of S_r	Effect of η	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8442	0.8397	0.8433	0.0035	-0.0009	0.0000
1.6	0.7801	0.7846	0.7775	0.7822	0.0046	-0.0025	0.0001
1.4	0.7276	0.7296	0.7224	0.7248	0.0022	-0.0050	0.0002
1.2	0.6799	0.6664	0.6713	0.6683	-0.0082	-0.0033	0.0052
1.0	0.6313	0.6195	0.6189	0.6074	-0.0116	-0.0122	0.0001
0.8	0.5746	0.5507	0.5584	0.5344	-0.0240	-0.0162	-0.0001
0.6	0.4977	0.4544	0.4791	0.4350	-0.0437	-0.0190	-0.0004
0.4	0.3615	0.2745	0.3487	0.2644	-0.0857	-0.0115	0.0014
0.2	0.2546	0.1837	0.2551	0.1839	-0.0711	0.0004	-0.0001
0.0	0.2563	0.1688	0.2563	0.1688	-0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
Z	S_1	S_9	S_5	S_{35}	Effect of S_r'	Effect of η	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8366	0.8397	0.8355	-0.0042	-0.0011	-0.0001
1.6	0.7601	0.7746	0.7775	0.7716	-0.0057	-0.0028	-0.0002
1.4	0.7276	0.7240	0.7224	0.7183	-0.0039	-0.0054	-0.0003
1.2	0.6799	0.6811	0.6713	0.6720	0.0010	-0.0088	-0.0003
1.0	0.6313	0.6400	0.6189	0.6272	0.0085	-0.0126	-0.0002
0.8	0.5746	0.5942	0.5584	0.5780	0.0196	-0.0162	-0.0000
0.6	0.4977	0.5346	0.4791	0.5162	0.0370	-0.0185	0.0001
0.4	0.3615	0.4352	0.3487	0.4205	0.0727	-0.0138	-0.0009
0.2	0.2546	0.3205	0.2551	0.3276	0.0722	0.0008	0.0003
0.0	0.2563	0.3438	0.2563	0.3438	0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
Z	S_1	S_4	S_{10}	S_{34}	Effect of S_r	Effect of η'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8442	0.8415	0.8449	0.0035	0.0008	-0.0001
1.6	0.7801	0.7846	0.7824	0.7866	0.0044	0.0021	-0.0001
1.4	0.7276	0.7296	0.7322	0.7338	0.0018	0.0044	-0.0002
1.2	0.6799	0.6664	0.6874	0.6836	-0.0086	0.0124	0.0049
1.0	0.6313	0.6195	0.6423	0.6304	-0.0119	0.0109	-0.0001
0.8	0.5746	0.5507	0.5897	0.5660	-0.0238	0.0152	0.0001
0.6	0.4977	0.4544	0.5175	0.4749	-0.0430	0.0201	0.0003
0.4	0.3615	0.2745	0.3874	0.2988	-0.0678	0.0251	-0.0008
0.2	0.2546	0.1837	0.2550	0.1838	-0.0710	0.0003	-0.0001
0.0	0.2563	0.1688	0.2563	0.1688	-0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
Z	S_1	S_4	S_6	S_{36}	Effect of S_r	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8442	0.8460	0.8489	0.0032	0.0050	-0.0003
1.6	0.7801	0.7846	0.7900	0.7936	0.0041	0.0095	-0.0005
1.4	0.7276	0.7296	0.7411	0.7422	0.0015	0.0130	-0.0005
1.2	0.6799	0.6664	0.6955	0.6912	-0.0089	0.0202	0.0046
1.0	0.6313	0.6195	0.6463	0.6337	-0.0122	0.0146	-0.0004
0.8	0.5746	0.5507	0.5838	0.5589	-0.0244	0.0087	-0.0005
0.6	0.4977	0.4544	0.4877	0.4398	-0.0456	-0.0123	-0.002?
0.4	0.3615	0.2745	0.2854	0.2138	-0.0793	-0.0684	0.0077
0.2	0.2546	0.1837	0.2537	0.1834	-0.0706	-0.0006	0.0003
0.0	0.2563	0.1688	0.2563	0.1688	-0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
Z	S_1	S_4	S_{11}	S_{37}	Effect of S_r	Effect of K_v'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8442	0.8358	0.8399	0.0038	-0.0046	0.0003
1.6	0.7801	0.7846	0.7715	0.7767	0.0049	-0.0082	0.0003
1.4	0.7276	0.7296	0.7163	0.7191	0.0024	-0.0109	0.0004
1.2	0.6799	0.6664	0.6672	0.6645	-0.0081	-0.0073	0.0054
1.0	0.6313	0.6195	0.6192	0.6081	-0.0115	-0.0118	0.0003
0.8	0.5746	0.5507	0.5666	0.5434	-0.0235	-0.0076	0.0004
0.6	0.4977	0.4544	0.5007	0.4599	-0.0421	0.0042	0.0012
0.4	0.3615	0.2745	0.4032	0.3303	-0.0800	0.0467	0.0071
0.2	0.2546	0.1837	0.2636	0.1868	-0.0739	0.0060	-0.0030
0.0	0.2563	0.1688	0.2563	0.1688	-0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
Z	S_1	S_9	S_{11}	S_{39}	Effect of S_r'	Effect of K_v'	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8366	0.8358	0.8313	-0.0043	-0.0051	-0.0002
1.6	0.7801	0.7746	0.7715	0.7652	-0.0059	-0.0090	-0.0004
1.4	0.7276	0.7240	0.7163	0.7120	-0.0039	-0.0117	-0.0004
1.2	0.6799	0.6811	0.6672	0.6678	0.0009	-0.0130	-0.0003
1.0	0.6313	0.6400	0.6192	0.6276	0.0086	-0.0122	-0.0002
0.8	0.5746	0.5942	0.5666	0.5860	0.0195	-0.0081	-0.0001
0.6	0.4977	0.5346	0.5007	0.5360	0.0361	0.0022	-0.0008
0.4	0.3615	0.4352	0.4032	0.4642	0.0673	0.0354	-0.0063
0.2	0.2546	0.3265	0.2636	0.3458	0.0770	0.0142	0.0051
0.0	0.2563	0.3438	0.2563	0.3440	0.0876	0.0001	0.0001

TABLE 8.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
Z	S_1	S_9	S_6	S_{38}	Effect of S_r'	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8366	0.8460	0.8425	-0.0038	0.0056	0.0003
1.6	0.7801	0.7746	0.7900	0.7854	-0.0051	0.0104	0.0005
1.4	0.7276	0.7240	0.7411	0.7384	-0.0031	0.0139	0.0004
1.2	0.6799	0.6811	0.6955	0.6975	0.0016	0.0160	0.0004
1.0	0.6313	0.6400	0.6463	0.6557	0.0091	0.0154	0.0003
0.8	0.5746	0.5942	0.5838	0.6046	0.0202	0.0098	0.0006
0.6	0.4977	0.5346	0.4877	0.5278	0.0385	-0.0084	0.0016
0.4	0.3615	0.4352	0.2854	0.3604	0.0743	-0.0755	0.0006
0.2	0.2546	0.3205	0.2537	0.3240	0.0711	-0.0017	-0.0008
0.0	0.2563	0.3438	0.2563	0.3438	0.0875	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
Z	S_1	S_5	S_6	S_{40}	Effect of η	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8397	0.8460	0.8449	-0.0010	0.0052	-0.0001
1.6	0.7801	0.7775	0.7900	0.7870	-0.0028	0.0097	-0.0002
1.4	0.7276	0.7224	0.7411	0.7381	-0.0041	0.0146	0.0011
1.2	0.6799	0.6713	0.6955	0.6855	-0.0093	0.0149	-0.0007
1.0	0.6313	0.6189	0.6463	0.6313	-0.0137	0.0137	-0.0013
0.8	0.5746	0.5584	0.5838	0.5631	-0.0185	0.0070	-0.0023
0.6	0.4977	0.4791	0.4877	0.4605	-0.0229	-0.0143	-0.0043
0.4	0.3615	0.3487	0.2854	0.2734	-0.0124	-0.0757	0.0004
0.2	0.2546	0.2551	0.2537	0.2537	0.0003	-0.0012	-0.0003
0.0	0.2563	0.2563	0.2563	0.2563	0.0000	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
Z	S_1	S_{10}	S_6	S_{42}	Effect of η'	Effect of K_v	Inter-action
2.0	0.9000	0.9000	0.9000	0.9000	0.0000	0.0000	-0.0000
1.8	0.8407	0.8415	0.8460	0.8469	0.0008	0.0053	0.0001
1.6	0.7801	0.7824	0.7900	0.7927	0.0025	0.0101	0.0002
1.4	0.7276	0.7322	0.7411	0.7465	0.0050	0.0139	0.0004
1.2	0.6799	0.6874	0.6955	0.7044	0.0082	0.0163	0.0007
1.0	0.6313	0.6423	0.6463	0.6599	0.0123	0.0163	0.0013
0.8	0.5746	0.5897	0.5838	0.6033	0.0173	0.0114	0.0022
0.6	0.4977	0.5175	0.4877	0.5152	0.0236	-0.0062	0.0039
0.4	0.3615	0.3874	0.2854	0.3121	0.0263	-0.0757	0.0004
0.2	0.2546	0.2550	0.2537	0.2537	0.0002	-0.0011	-0.0002
0.0	0.2563	0.2563	0.2563	0.2563	0.0000	0.0000	0.0000

TABLE 8.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
Z	S_1	S_3	S_{11}	S_{41}	Effect of η	Effect of K_v'	Inter-action
2.0	0.9000	0.3487	0.9000	0.9000	-0.2757	0.2757	0.2757
1.8	0.8407	0.2551	0.8358	0.8350	-0.2932	0.2875	0.2924
1.6	0.7801	0.2563	0.7715	0.7691	-0.2631	0.2521	0.2607
1.4	0.7276	0.0000	0.7163	0.7117	-0.3661	0.3502	0.3615
1.2	0.6799	0.0000	0.6672	0.6598	-0.3437	0.3236	0.3363
1.0	0.6313	0.0000	0.6192	0.6087	-0.3209	0.2983	0.3104
0.8	0.5746	0.0000	0.5666	0.5534	-0.2939	0.2727	0.2807
0.6	0.4977	0.0000	0.5007	0.4869	-0.2558	0.2450	0.2420
0.4	0.3615	0.9000	0.4032	0.3951	0.2652	-0.2316	-0.2733
0.2	0.2546	0.8397	0.2636	0.2707	0.2961	-0.2800	-0.2890
0.0	0.2563	0.7775	0.2563	0.2566	0.2608	-0.2605	-0.2605

TABLE 9.--Distribution of Capillary Pressure, Main Effect, and Interactive Effect Along the Axis of Symmetry at the Dimensionless Time τ = 1.88.

Parameter Varied	None	λ	P_b	λ & P_b			
Z	P_{c_1}	P_{c_2}	P_{c_3}	$P_{c_{12}}$	Effect of λ	Effect of P_b	Inter-action
2.0	1.1333	1.1011	1.4733	1.4314	-0.0370	0.3351	-0.0048
1.8	1.2307	1.3029	1.5458	1.4878	0.0071	0.2500	-0.0651
1.6	1.3489	1.5300	1.6291	1.5620	0.0570	0.1561	-0.1241
1.4	1.4716	1.7758	1.7073	1.6414	0.1191	0.0506	-0.1851
1.2	1.6042	2.0899	1.7928	1.7385	0.2157	-0.0814	-0.2700
1.0	1.7662	2.5964	1.9177	1.8841	0.3983	-0.2804	-0.4319
0.8	2.0017	3.7737	2.1654	2.1512	0.8789	-0.7294	-0.8931
0.6	2.4445	7.7304	2.9495	2.8295	2.5829	-2.1980	-2.7030
0.4	4.0195	8.3904	8.1294	6.5172	1.3794	1.1183	-2.9916
0.2	6.1231	8.2000	8.1999	8.1899	0.0334	0.0334	-0.0434
0.0	7.9998	8.0000	8.0000	7.9999	0.0001	0.0000	-0.0002

TABLE 9.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
Z	P_{c_1}	P_{c_7}	P_{c_3}	$P_{c_{13}}$	Effect of λ'	Effect of P_b	Inter-action
2.0	1.1333	1.1958	1.4733	1.5545	0.0719	0.3493	0.0094
1.8	1.2307	1.3126	1.5458	1.6483	0.0922	0.3254	0.0103
1.6	1.3489	1.4415	1.6291	1.7422	0.1028	0.2905	0.0102
1.4	1.4716	1.5626	1.7073	1.8188	0.1013	0.2459	0.0102
1.2	1.6042	1.6836	1.7928	1.8943	0.0905	0.1996	0.0111
1.0	1.7662	1.8270	1.9177	2.0060	0.0745	0.1652	0.0137
0.8	2.0017	2.0439	2.1654	2.2590	0.0679	0.1894	0.0257
0.6	2.4445	2.5226	2.9495	3.6897	0.4091	0.8361	0.3311
0.4	4.0195	6.2283	8.1294	8.3913	1.2354	3.1365	-0.9734
0.2	8.1231	8.1992	8.1999	8.2000	0.0381	0.0388	-0.0380
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	λ	S_r	λ & S_r			
Z	P_{c_1}	P_{c_2}	P_{c_4}	$P_{c_{15}}$	Effect of λ	Effect of S_r	Inter-action
2.0	1.1333	1.1011	1.1538	1.1164	-0.0348	0.0179	-0.0026
1.8	1.2307	1.3029	1.2537	1.3222	0.0703	0.0212	-0.0019
1.6	1.3489	1.5300	1.3749	1.5535	0.1799	0.0247	-0.0013
1.4	1.4716	1.7758	1.5011	1.8039	0.3035	0.0288	-0.0007
1.2	1.6042	2.0899	1.6389	2.1253	0.4861	0.0350	0.0003
1.0	1.7662	2.5964	1.8104	2.6505	0.8352	0.0492	0.0050
0.8	2.0017	3.7737	2.0681	3.9172	1.8106	0.1050	0.0385
0.6	2.4445	7.7304	2.5841	7.9491	5.3255	0.1791	0.0396
0.4	4.0195	8.3904	4.9320	8.3937	3.9163	0.4579	-0.4546
0.2	6.1231	8.2000	8.1779	8.2000	0.0495	0.0274	-0.0274
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	λ	S_r'	λ & S_r'			
Z	P_{c_1}	P_{c_2}	P_{c_9}	$P_{c_{16}}$	Effect of λ	Effect of S_r'	Inter-action
2.0	1.1333	1.1011	1.1176	1.0893	-0.0302	-0.0137	0.0020
1.8	1.2307	1.3029	1.2131	1.2885	0.0738	-0.0160	0.0016
1.6	1.3489	1.5300	1.3292	1.5131	0.1825	-0.0183	0.0014
1.4	1.4716	1.7758	1.4495	1.7566	0.3056	-0.0207	0.0014
1.2	1.6042	2.0899	1.5788	2.0674	0.4872	-0.0240	0.0014
1.0	1.7662	2.5964	1.7348	2.5653	0.8303	-0.0312	0.0001
0.8	2.0017	3.7737	1.9565	3.6982	1.7569	-0.0604	-0.0152
0.6	2.4445	7.7304	2.3504	7.5716	5.2536	-0.1265	-0.0324
0.4	4.0195	8.3904	3.5087	8.3871	4.6247	-0.2570	0.2538
0.2	6.1231	8.2000	7.9779	8.1999	0.1495	-0.0726	0.0725
0.0	7.9998	8.0000	7.9992	8.0000	0.0005	-0.0003	0.0003

TABLE 9.--Continued.

Parameter Varied	None	λ'	S_r	λ' & S_r			
Z	P_{c_1}	P_{c_7}	P_{c_4}	$P_{c_{17}}$	Effect of λ'	Effect of S_r	Inter-action
2.0	1.1333	1.1958	1.1538	1.2268	0.0678	0.0258	0.0053
1.8	1.2307	1.3126	1.2537	1.3467	0.0874	0.0285	0.0055
1.6	1.3489	1.4415	1.3749	1.4790	0.0984	0.0318	0.0058
1.4	1.4716	1.5626	1.5011	1.6042	0.0971	0.0355	0.0061
1.2	1.6042	1.6836	1.6389	1.7315	0.0860	0.0413	0.0066
1.0	1.7662	1.8270	1.8104	1.8871	0.0688	0.0522	0.0079
0.8	2.0017	2.0439	2.0681	2.1348	0.0545	0.0787	0.0122
0.6	2.4445	2.5226	2.5841	2.7436	0.1188	0.1803	0.0407
0.4	4.0195	6.2283	4.9320	7.6371	2.4569	1.1607	0.2482
0.2	6.1231	8.1992	8.1779	8.1999	0.0491	0.0278	-0.0271
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
Z	P_{c_1}	P_{c_7}	P_{c_9}	$P_{c_{18}}$	Effect of λ'	Effect of S_r'	Inter-action
2.0	1.1333	1.1958	1.1176	1.1722	0.0586	-0.0197	-0.0039
1.8	1.2307	1.3126	1.2131	1.2867	0.0778	-0.0218	-0.0042
1.6	1.3489	1.4415	1.3292	1.4132	0.0883	-0.0240	-0.0043
1.4	1.4716	1.5626	1.4495	1.5315	0.0865	-0.0266	-0.0045
1.2	1.6042	1.6836	1.5788	1.6484	0.0745	-0.0303	-0.0049
1.0	1.7662	1.8270	1.7348	1.7836	0.0548	-0.0374	-0.0060
0.8	2.0017	2.0439	1.9565	1.7801	-0.0671	-0.1545	-0.1093
0.6	2.4445	2.5226	2.3504	2.3770	0.0523	-0.1199	-0.0258
0.4	4.0195	6.2283	3.5087	4.6008	1.7505	-0.9692	-0.4583
0.2	6.1231	8.1992	7.9779	8.1964	0.1473	-0.0740	0.0712
0.0	7.9998	8.0000	7.9992	8.0000	0.0005	-0.0003	0.0003

TABLE 9.--Continued.

Parameter Varied	None	λ'	η	λ' & η			
Z	P_{c_1}	P_{c_7}	P_{c_5}	$P_{c_{19}}$	Effect of λ'	Effect of η	Inter-action
2.0	1.1333	1.1958	1.1333	1.1958	0.0625	0.0000	0.0000
1.8	1.2307	1.3126	1.2324	1.3156	0.0826	0.0023	0.0007
1.6	1.3489	1.4415	1.3547	1.4498	0.0939	0.0071	0.0013
1.4	1.4716	1.5626	1.4850	1.5800	0.0930	0.0154	0.0020
1.2	1.6042	1.6836	1.6305	1.7149	0.0819	0.0288	0.0025
1.0	1.7662	1.8270	1.8128	1.8786	0.0633	0.0491	0.0025
0.8	2.0017	2.0439	2.0180	2.1279	0.0761	0.0502	0.0338
0.6	2.4445	2.5226	2.5831	2.6746	0.0848	0.1453	0.0067
0.4	4.0195	6.2283	4.2784	6.5193	2.2249	0.2749	0.0160
0.2	8.1231	8.1992	8.0838	8.1986	0.0955	-0.0199	0.0193
0.0	7.9998	8.0000	7.9990	8.0000	0.0006	-0.0004	0.0004

TABLE 9.--Continued

Parameter Varied	None	λ	K_v	λ & K_v			
Z	P_{c_1}	P_{c_2}	P_{c_6}	$P_{c_{20}}$	Effect of λ	Effect of K_v	Inter-action
2.0	1.1333	1.1011	1.1333	1.1011	-0.0322	0.0000	0.0000
1.8	1.2307	1.3029	1.2213	1.2952	0.0730	-0.0085	0.0008
1.6	1.3489	1.5300	1.3280	1.5109	0.1820	-0.0200	0.0009
1.4	1.4716	1.7758	1.4379	1.7435	0.3049	-0.0330	0.0007
1.2	1.6042	2.0899	1.5582	2.0483	0.4879	-0.0438	0.0022
1.0	1.7662	2.5964	1.7127	2.5773	0.8474	-0.0363	0.0172
0.8	2.0017	3.7737	1.9595	4.1400	1.9763	0.1620	0.2042
0.6	2.4445	7.7304	2.5173	8.3968	5.5827	0.3696	0.2968
0.4	4.0195	8.3904	6.2792	8.3991	3.2454	1.1342	-1.1255
0.2	8.1231	8.2000	8.1973	8.2000	0.0398	0.0371	-0.0371
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
Z	P_{c_1}	P_{c_2}	$P_{c_{11}}$	$P_{c_{21}}$	Effect of λ	Effect of K_v'	Inter-action
2.0	1.1333	1.1011	1.1333	1.1011	-0.0322	0.0000	0.0000
1.8	1.2307	1.3029	1.2393	1.3100	0.0714	0.0079	-0.0007
1.6	1.3489	1.5300	1.3677	1.5475	0.1805	0.0182	-0.0007
1.4	1.4716	1.7758	1.5010	1.8046	0.3039	0.0291	-0.0003
1.2	1.6042	2.0899	1.6434	2.1267	0.4845	0.0380	-0.0012
1.0	1.7662	2.5964	1.8114	2.6174	0.8181	0.0331	-0.0121
0.8	2.0017	3.7737	2.0404	3.6105	1.6711	-0.0623	-0.1010
0.6	2.4445	7.7304	2.4238	6.6888	4.7755	-0.5311	-0.5104
0.4	4.0195	8.3904	3.3575	8.3468	4.6801	-0.3528	0.3092
0.2	8.1231	8.2000	7.4848	8.1990	0.3956	-0.3196	0.3187
0.0	7.9998	8.0000	7.9948	8.0000	0.0027	-0.0025	0.0025

TABLE 9.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
Z	P_{c_1}	P_{c_7}	P_{c_6}	$P_{c_{22}}$	Effect of λ'	Effect of K_v	Inter-action
2.0	1.1333	1.1958	1.1333	1.1958	0.0625	0.0000	0.0000
1.8	1.2307	1.3126	1.2213	1.3018	0.0812	-0.0101	-0.0007
1.6	1.3489	1.4415	1.3280	1.4186	0.0916	-0.0219	-0.0010
1.4	1.4716	1.5626	1.4379	1.5278	0.0904	-0.0343	-0.0006
1.2	1.6042	1.6836	1.5582	1.6393	0.0802	-0.0452	0.0008
1.0	1.7662	1.8270	1.7127	1.7801	0.0641	-0.0502	0.0033
0.8	2.0017	2.0439	1.9595	2.0185	0.0506	-0.0338	0.0084
0.6	2.4445	2.5226	2.5173	2.6811	0.1209	0.1157	0.0426
0.4	4.0195	6.2283	6.2792	8.1403	2.0349	2.0859	-0.1739
0.2	8.1231	8.1992	8.1973	8.2000	0.0394	0.0375	-0.0367
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
Z	P_{c_1}	P_{c_7}	$P_{c_{11}}$	$P_{c_{23}}$	Effect of λ'	Effect of K_v'	Inter-action
2,0	1,1333	1,1958	1,1333	1,1958	0,0625	0,0000	0,0000
1,8	1,2307	1,3126	1,2393	1,3226	0,0826	0,0093	0,0007
1,6	1,3489	1,4415	1,3677	1,4620	0,0935	0,0197	0,0008
1,4	1,4716	1,5626	1,5010	1,5929	0,0915	0,0298	0,0004
1,2	1,6042	1,6836	1,6434	1,7213	0,0787	0,0385	-0,0007
1,0	1,7662	1,8270	1,8114	1,6666	0,0580	0,0424	-0,0028
0,8	2,0017	2,0439	2,0404	2,0695	0,0357	0,0321	-0,0066
0,6	2,4445	2,5226	2,4238	2,4518	0,0530	-0,0457	-0,0251
0,4	4,0195	6,2283	3,3575	4,1917	1,5215	-1,3493	-0,6873
0,2	8,1231	8,1992	7,4848	8,1869	0,3891	-0,3253	0,3130
0,0	7,9998	8,0000	7,9948	8,0000	0,0027	-0,0025	0,0025

TABLE 9.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
Z	P_{c_1}	P_{c_3}	P_{c_4}	$P_{c_{24}}$	Effect of P_b	Effect of S_r	Inter-action
2.0	1,1333	1,4733	1,1538	1,5000	0,3431	0,0236	0,0031
1.8	1,2307	1,5458	1,2537	1,5748	0,3181	0,0260	0,0030
1.6	1,3489	1,6291	1,3749	1,6608	0,2831	0,0288	0,0028
1.4	1,4716	1,7073	1,5011	1,7423	0,2384	0,0322	0,0028
1.2	1,6042	1,7928	1,6389	1,8332	0,1914	0,0376	0,0028
1.0	1,7662	1,9177	1,8104	1,9691	0,1551	0,0478	0,0036
0.8	2,0017	2,1654	2,0681	2,2492	0,1724	0,0751	0,0087
0.6	2,4445	2,9495	2,5841	3,2677	0,5943	0,2289	0,0893
0.4	4,0195	8,1294	4,9320	8,2968	3,7374	0,5400	-0,3726
0.2	8,1231	8,1999	8,1779	8,2000	0,0494	0,0274	-0,0274
0.0	7,9998	8,0000	8,0000	8,0000	0,0001	0,0001	-0,0001

TABLE 9.--Continued.

Parameter Varied	None	P_b	S_r'	P_v & S_r'			
Z	P_{c_1}	P_{c_3}	P_{c_9}	$P_{c_{25}}$	Effect of P_b	Effect of S_r'	Inter-action
2,0	1,1333	1,4733	1,1176	1,4529	0,3377	-0,0180	-0,0023
1,8	1,2307	1,5458	1,2131	1,5238	0,3129	-0,0198	-0,0022
1,6	1,3489	1,6291	1,3292	1,6053	0,2782	-0,0218	-0,0021
1,4	1,4716	1,7073	1,4495	1,6814	0,2338	-0,0240	-0,0019
1,2	1,6042	1,7928	1,5788	1,7635	0,1866	-0,0273	-0,0019
1,0	1,7662	1,9177	1,7348	1,8811	0,1489	-0,0340	-0,0026
0,8	2,0017	2,1654	1,9565	2,1070	0,1571	-0,0518	-0,0066
0,6	2,4445	2,9495	2,3504	2,7681	0,4614	-0,1378	-0,0436
0,4	4,0195	8,1294	3,5087	7,8289	4,2151	-0,4056	0,1052
0,2	8,1231	8,1999	7,9779	8,1998	0,1494	-0,0727	0,0725
0,0	7,9998	8,0000	7,9992	8,0000	0,0005	-0,0003	0,0003

TABLE 9.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
Z	P_{c_1}	P_{c_8}	P_{c_4}	$P_{c_{26}}$	Effect of P_b'	Effect of S_r	Inter-action
2.0	1,1333	0,7933	1,1538	0,8077	-0,3431	0,0174	-0,0031
1.8	1,2307	0,9190	1,2537	0,9362	-0,3146	0,0201	-0,0029
1.6	1,3489	1,0750	1,3749	1,0957	-0,2765	0,0234	-0,0026
1.4	1,4716	1,2482	1,5011	1,2726	-0,2258	0,0270	-0,0024
1.2	1,6042	1,4383	1,6389	1,4680	-0,1684	0,0322	-0,0025
1.0	1,7662	1,6548	1,8104	1,6927	-0,1145	0,0410	-0,0032
0.8	2,0017	1,9205	2,0681	1,9738	-0,0877	0,0599	-0,0065
0.6	2,4445	2,2883	2,5841	2,3755	-0,1824	0,1134	-0,0262
0.4	4,0195	2,9030	4,9320	3,1135	-1,4675	0,5615	-0,3510
0.2	8,1231	4,5168	8,1779	5,5220	-3,1311	0,5300	0,4752
0.0	7,9998	7,4354	8,0000	7,6553	-0,3545	0,2100	0,2099

TABLE 9.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
Z	P_{c_1}	P_{c_8}	P_{c_9}	$P_{c_{27}}$	Effect of P_b'	Effect of S_r'	Inter-action
2.0	1.1333	0.7933	1.1176	0.7824	-0.3376	-0.0133	0.0024
1.8	1.2307	0.9190	1.2131	0.9058	-0.3095	-0.0154	0.0022
1.6	1.3489	1.0750	1.3292	1.0592	-0.2719	-0.0177	0.0020
1.4	1.4716	1.2482	1.4495	1.2295	-0.2217	-0.0204	0.0017
1.2	1.6042	1.4383	1.5788	1.4160	-0.1644	-0.0238	0.0016
1.0	1.7662	1.6548	1.7348	1.6270	-0.1096	-0.0296	0.0018
0.8	2.0017	1.9205	1.9565	1.8827	-0.0775	-0.0415	0.0037
0.6	2.4445	2.2883	2.3504	2.2240	-0.1413	-0.0792	0.0149
0.4	4.0195	2.9030	3.5087	2.7643	-0.9305	-0.3248	0.1860
0.2	8.1231	4.5166	7.9779	3.9490	-3.8176	-0.3565	-0.2113
0.0	7.9998	7.4354	7.9992	6.4140	-1.0748	-0.5110	-0.5104

TABLE 9.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
Z	P_{c_1}	P_{c_3}	P_{c_5}	$P_{c_{28}}$	Effect of P_b	Effect of η	Inter-action
2.0	1.1333	1.4733	1.1333	1.4733	0.3400	0.0000	0.0000
1.8	1.2307	1.5458	1.2324	1.5495	0.3161	0.0027	0.0010
1.6	1.3489	1.6291	1.3547	1.6401	0.2828	0.0084	0.0026
1.4	1.4716	1.7073	1.4850	1.7302	0.2404	0.0182	0.0048
1.2	1.6042	1.7928	1.6305	1.8339	0.1960	0.0337	0.0074
1.0	1.7662	1.9177	1.8128	1.9862	0.1635	0.0586	0.0120
0.8	2.0017	2.1654	2.0180	2.2933	0.2195	0.0721	0.0558
0.6	2.4445	2.9495	2.5831	3.3142	0.6181	0.2516	0.1130
0.4	4.0195	8.1294	4.2784	8.2239	4.0277	0.1767	-0.0822
0.2	8.1231	8.1999	8.0836	8.1999	0.0965	-0.0196	0.0196
0.0	7.9998	8.0000	7.9990	8.0000	0.0006	-0.0004	0.0004

TABLE 9.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
Z	P_{c_1}	P_{c_3}	$P_{c_{10}}$	$P_{c_{29}}$	Effect of P_b	Effect of η'	Inter-action
2.0	1.1333	1.4733	1.1333	1.4733	0.3400	0.0000	0.0000
1.8	1.2307	1.5458	1.2293	1.4422	0.2640	-0.0525	-0.0511
1.6	1.3489	1.6291	1.3440	1.6186	0.2774	-0.0077	-0.0028
1.4	1.4716	1.7073	1.4601	1.6857	0.2306	-0.0166	-0.0050
1.2	1.6042	1.7928	1.5818	1.7546	0.1807	-0.0303	-0.0079
1.0	1.7662	1.9177	1.7266	1.8532	0.1391	-0.0521	-0.0125
0.8	2.0017	2.1654	1.9333	2.0498	0.1401	-0.0920	-0.0236
0.6	2.4445	2.9495	2.3128	2.6517	0.4220	-0.2147	-0.0831
0.4	4.0195	8.1294	3.5803	7.6326	4.1811	-0.3660	0.0712
0.2	8.1231	8.1999	8.0970	8.1999	0.0899	-0.0131	0.0131
0.0	7.9998	8.0000	7.9998	8.0000	0.0002	0.0000	0.0000

TABLE 9.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
Z	P_{c_1}	P_{c_3}	P_{c_6}	$P_{c_{30}}$	Effect of P_b	Effect of K_v	Inter-action
2.0	1.1333	1.4733	1.1333	1.4733	0.3400	0.0000	0.0000
1.8	1.2307	1.5458	1.2213	1.5358	0.3148	-0.0097	-0.0003
1.6	1.3489	1.6291	1.3260	1.6064	0.2803	-0.0208	0.0001
1.4	1.4716	1.7073	1.4379	1.6765	0.2371	-0.0322	0.0015
1.2	1.6042	1.7928	1.5582	1.7554	0.1929	-0.0417	0.0043
1.0	1.7662	1.9177	1.7127	1.8836	0.1613	-0.0437	0.0098
0.8	2.0017	2.1654	1.9595	2.1784	0.1913	-0.0146	0.0276
0.6	2.4445	2.9495	2.5173	3.7592	0.8735	0.4413	0.3684
0.4	4.0195	8.1294	6.2792	8.3830	3.1069	1.2567	-1.0031
0.2	8.1231	8.1999	8.1973	8.2000	0.0397	0.0371	-0.0371
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
Z	P_{c_1}	P_{c_3}	$P_{c_{11}}$	$P_{c_{31}}$	Effect of P_b	Effect of K_v'	Inter-action
2.0	1.1333	1.4733	1.1333	1.4733	0.3400	0.0000	0.0000
1.8	1.2307	1.5458	1.2393	1.5551	0.3155	0.0089	0.0003
1.6	1.3489	1.6291	1.3677	1.6479	0.2802	0.0188	-0.0000
1.4	1.4716	1.7073	1.5010	1.7342	0.2344	0.0282	-0.0012
1.2	1.6042	1.7928	1.6434	1.8246	0.1849	0.0355	-0.0037
1.0	1.7662	1.9177	1.8114	1.9461	0.1431	0.0368	-0.0084
0.8	2.0017	2.1654	2.0404	2.1624	0.1429	0.0179	-0.0209
0.6	2.4445	2.9495	2.4236	2.7260	0.4036	-0.1221	-0.1014
0.4	4.0195	8.1294	3.3575	6.8799	3.8162	-0.9557	-0.2938
0.2	8.1231	8.1999	7.4848	8.1988	0.3954	-0.3197	0.3186
0.0	7.9998	8.0000	7.9948	8.0000	0.0027	-0.0025	0.0025

TABLE 9.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
Z	P_{c_1}	P_{c_8}	$P_{c_{11}}$	$P_{c_{32}}$	Effect of P_b'	Effect of K_v'	Inter-action
2.0	1.1333	0.7933	1.1333	0.7933	-0.3400	0.0000	-0.0000
1.8	1.2307	0.9190	1.2393	0.9262	-0.3124	0.0079	-0.0007
1.6	1.3489	1.0750	1.3677	1.0919	-0.2749	0.0179	-0.0010
1.4	1.4716	1.2482	1.5010	1.2770	-0.2237	0.0291	-0.0003
1.2	1.6042	1.4383	1.6434	1.4795	-0.1649	0.0402	0.0010
1.0	1.7662	1.6548	1.8114	1.7032	-0.1098	0.0468	0.0016
0.8	2.0017	1.9205	2.0404	1.9496	-0.0860	0.0339	-0.0048
0.6	2.4445	2.2883	2.4238	2.1634	-0.2083	-0.0728	-0.0521
0.4	4.0195	2.9030	3.3575	2.5032	-0.9854	-0.5309	0.1311
0.2	8.1231	4.5168	7.4848	2.8335	-4.1288	-1.1608	-0.5225
0.0	7.9998	7.4354	7.9948	3.5071	-2.5261	-1.9667	-1.9617

TABLE 9.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
Z	P_{c_1}	P_{c_4}	$P_{c_{10}}$	$P_{c_{34}}$	Effect of S_r	Effect of η'	Inter-action
2.0	1.1333	1.1538	1.1333	1.1538	0.0205	0.0000	0.0000
1.8	1.2307	1.2537	1.2293	1.2523	0.0230	-0.0014	-0.0000
1.6	1.3489	1.3749	1.3440	1.3700	0.0260	-0.0049	0.0000
1.4	1.4716	1.5011	1.4601	1.4896	0.0295	-0.0115	0.0000
1.2	1.6042	1.6389	1.5818	1.6162	0.0346	-0.0226	-0.0001
1.0	1.7662	1.8104	1.7266	1.7694	0.0435	-0.0403	-0.0007
0.8	2.0017	2.0681	1.9333	1.9953	0.0642	-0.0706	-0.0022
0.6	2.4445	2.5841	2.3128	2.4386	0.1328	-0.1385	-0.0068
0.4	4.0195	4.9320	3.5803	4.3585	0.8454	-0.5063	-0.0672
0.2	8.1231	8.1779	8.0970	8.1725	0.0652	-0.0158	0.0103
0.0	7.9998	8.0000	7.9998	8.0000	0.0002	0.0000	0.0000

TABLE 9.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
Z	P_{c_1}	P_{c_4}	P_{c_5}	$P_{c_{33}}$	Effect of S_r	Effect of η	Inter-action
2.0	1.1333	1.1538	1.1333	1.1536	0.0205	0.0000	0.0000
1.8	1.2307	1.2537	1.2324	1.2554	0.0230	0.0017	0.0000
1.6	1.3489	1.3749	1.3547	1.3807	0.0260	0.0058	0.0000
1.4	1.4716	1.5011	1.4850	1.5147	0.0296	0.0135	0.0001
1.2	1.6042	1.6389	1.6305	1.6655	0.0349	0.0264	0.0001
1.0	1.7662	1.8104	1.8128	1.8582	0.0448	0.0472	0.0006
0.8	2.0017	2.0681	2.0180	2.1514	0.0999	0.0498	0.0335
0.6	2.4445	2.5841	2.5931	2.7384	0.1474	0.1465	0.0079
0.4	4.0195	4.9320	4.2784	5.2167	0.9254	0.2718	0.0129
0.2	8.1231	8.1779	6.0838	8.1650	0.0680	-0.0261	0.0132
0.0	7.9998	8.0000	7.9990	7.9998	0.0005	-0.0005	0.0003

TABLE 9.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
Z	P_{c_1}	P_{c_9}	P_{c_5}	$P_{c_{35}}$	Effect of S_r'	Effect of η	Inter-action
2.0	1.1333	1.1176	1.1333	1.1176	-0.0157	0.0000	0.0000
1.8	1.2307	1.2131	1.2324	1.2148	-0.0176	0.0017	0.0000
1.6	1.3489	1.3292	1.3547	1.3350	-0.0197	0.0058	0.0000
1.4	1.4716	1.4495	1.4850	1.4630	-0.0220	0.0134	0.0001
1.2	1.6042	1.5788	1.6305	1.6052	-0.0253	0.0264	0.0001
1.0	1.7662	1.7348	1.8128	1.7813	-0.0314	0.0465	-0.0001
0.8	2.0017	1.9565	2.0180	2.0345	-0.0143	0.0471	0.0308
0.6	2.4445	2.3504	2.5831	2.4829	-0.0972	0.1356	-0.0030
0.4	4.0195	3.5087	4.2784	3.7532	-0.5180	0.2517	-0.0072
0.2	8.1231	7.9779	8.0838	7.8929	-0.1680	-0.0621	-0.0229
0.0	7.9998	7.9992	7.9990	7.9966	-0.0015	-0.0017	-0.0009

TABLE 9.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
Z	P_{c_1}	P_{c_4}	$P_{c_{11}}$	$P_{c_{37}}$	Effect of S_r	Effect of K_v'	Inter-action
2.0	1.1333	1.1538	1.1333	1.1538	0.0205	0.0000	0.0000
1.8	1.2307	1.2537	1.2393	1.2626	0.0232	0.0088	0.0001
1.6	1.3489	1.3749	1.3677	1.3940	0.0261	0.0190	0.0001
1.4	1.4716	1.5011	1.5010	1.5310	0.0297	0.0297	0.0003
1.2	1.6042	1.6389	1.6434	1.6786	0.0350	0.0394	0.0002
1.0	1.7662	1.8104	1.8114	1.8556	0.0442	0.0452	-0.0000
0.8	2.0017	2.0681	2.0404	2.1043	0.0652	0.0375	-0.0013
0.6	2.4445	2.5841	2.4238	2.5436	0.1297	-0.0306	-0.0099
0.4	4.0195	4.9320	3.3575	3.7876	0.6713	-0.9032	-0.2412
0.2	8.1231	8.1779	7.4846	7.9646	0.2673	-0.4258	0.2125
0.0	7.9998	8.0000	7.9948	7.9987	0.0021	-0.0032	0.0019

TABLE 9.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
Z	P_{c_1}	P_{c_4}	P_{c_6}	$P_{c_{36}}$	Effect of S_r	Effect of K_v	Inter-action
2.0	1.1333	1.1538	1.1333	1.1538	0.0205	0.0000	0.0000
1.8	1.2307	1.2537	1.2213	1.2442	0.0229	-0.0094	-0.0001
1.6	1.3489	1.3749	1.3280	1.3537	0.0259	-0.0210	-0.0001
1.4	1.4716	1.5011	1.4379	1.4670	0.0293	-0.0339	-0.0002
1.2	1.6042	1.6389	1.5582	1.5925	0.0345	-0.0462	-0.0002
1.0	1.7662	1.8104	1.7127	1.7572	0.0443	-0.0534	0.0001
0.8	2.0017	2.0681	1.9595	2.0285	0.0677	-0.0409	0.0013
0.6	2.4445	2.5841	2.5173	2.6983	0.1603	0.0935	0.0207
0.4	4.0195	4.9320	6.2792	7.3501	0.9917	2.3389	0.0792
0.2	8.1231	8.1779	8.1973	8.1992	0.0284	0.0478	-0.0265
0.0	7.9998	8.0000	8.0000	8.0000	0.0001	0.0001	-0.0001

TABLE 9.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
Z	P_{c_1}	P_{c_9}	P_{c_6}	$P_{c_{38}}$	Effect of S_r'	Effect of K_v	Inter-action
2.0	1.1333	1.1176	1.1333	1.1176	-0.0157	0.0000	0.0000
1.8	1.2307	1.2131	1.2213	1.2039	-0.0175	-0.0093	0.0001
1.6	1.3489	1.3292	1.3280	1.3086	-0.0195	-0.0207	0.0002
1.4	1.4716	1.4495	1.4379	1.4162	-0.0219	-0.0335	0.0002
1.2	1.6042	1.5788	1.5582	1.5332	-0.0252	-0.0458	0.0002
1.0	1.7662	1.7348	1.7127	1.6807	-0.0317	-0.0538	-0.0003
0.8	2.0017	1.9565	1.9595	1.9099	-0.0474	-0.0444	-0.0022
0.6	2.4445	2.3504	2.5173	2.3976	-0.1069	0.0600	-0.0128
0.4	4.0195	3.5087	6.2792	5.2538	-0.7681	2.0024	-0.2573
0.2	8.1231	7.9779	8.1973	8.1922	-0.0751	0.1443	0.0700
0.0	7.9998	7.9992	8.0000	8.0000	-0.0003	0.0005	0.0003

TABLE 9.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
Z	P_{c_1}	P_{c_9}	$P_{c_{11}}$	$P_{c_{39}}$	Effect of S_r'	Effect of K_v'	Inter-action
2.0	1.1333	1.1176	1.1333	1.1176	-0.0157	0.0000	0.0000
1.8	1.2307	1.2131	1.2393	1.2217	-0.0176	0.0086	0.0000
1.6	1.3489	1.3292	1.3677	1.3477	-0.0199	0.0187	-0.0001
1.4	1.4716	1.4495	1.5010	1.4785	-0.0223	0.0292	-0.0002
1.2	1.6042	1.5788	1.6434	1.6176	-0.0256	0.0390	-0.0002
1.0	1.7662	1.7348	1.8114	1.7796	-0.0316	0.0450	-0.0002
0.8	2.0017	1.9565	2.0404	1.9953	-0.0451	0.0387	0.0000
0.6	2.4445	2.3504	2.4238	2.3410	-0.0885	-0.0150	0.0056
0.4	4.0195	3.5087	3.3575	3.1074	-0.3804	-0.5317	0.1303
0.2	8.1231	7.9779	7.4848	6.6466	-0.4917	-0.9848	-0.3465
0.0	7.9998	7.9992	7.9948	7.9814	-0.0070	-0.0114	-0.0064

TABLE 9.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
Z	P_{c_1}	P_{c_5}	P_{c_6}	$P_{c_{40}}$	Effect of η	Effect of K_v	Inter-action
2.0	1.1333	1.1333	1.1333	1.1333	0.0000	0.0000	0.0000
1.8	1.2307	1.2324	1.2213	1.2232	0.0018	-0.0093	0.0001
1.6	1.3489	1.3547	1.3280	1.3344	0.0061	-0.0206	0.0003
1.4	1.4716	1.4850	1.4379	1.4527	0.0141	-0.0330	0.0007
1.2	1.6042	1.6305	1.5582	1.5874	0.0278	-0.0445	0.0015
1.0	1.7662	1.8128	1.7127	1.7660	0.0500	-0.0501	0.0033
0.8	2.0017	2.0180	1.9595	2.0575	0.0572	-0.0013	0.0408
0.6	2.4445	2.5831	2.5173	2.7371	0.1792	0.1134	0.0406
0.4	4.0195	4.2784	6.2792	6.8866	0.4332	2.4340	0.1742
0.2	8.1231	8.0838	8.1973	8.1968	-0.0199	0.0936	0.0194
0.0	7.9998	7.9990	8.0000	8.0000	-0.0004	0.0006	0.0004

TABLE 9.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
Z	P_{c_1}	P_{c_5}	$P_{c_{11}}$	$P_{c_{41}}$	Effect of η	Effect of K_v'	Inter-action
2.0	1.1333	1.1333	1.1333	1.1333	0.0000	0.0000	0.0000
1.8	1.2307	1.2324	1.2393	1.2409	0.0016	0.0086	-0.0000
1.6	1.3489	1.3547	1.3677	1.3729	0.0055	0.0185	-0.0003
1.4	1.4716	1.4850	1.5010	1.5134	0.0129	0.0289	-0.0005
1.2	1.6042	1.6305	1.6434	1.6674	0.0252	0.0381	-0.0011
1.0	1.7662	1.8128	1.8114	1.8530	0.0441	0.0427	-0.0025
0.8	2.0017	2.0180	2.0404	2.1070	0.0415	0.0639	0.0252
0.6	2.4445	2.5831	2.4238	2.5233	0.1191	-0.0402	-0.0196
0.4	4.0195	4.2784	3.3575	3.4673	0.1844	-0.7365	-0.0745
0.2	8.1231	8.0838	7.4848	7.0446	-0.2397	-0.8387	-0.2005
0.0	7.9998	7.9990	7.9948	7.9719	-0.0119	-0.0160	-0.0111

TABLE 9.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
Z	P_{c_1}	$P_{c_{10}}$	P_{c_6}	$P_{c_{42}}$	Effect of η'	Effect of K_v	Inter-action
2.0	1.1333	1.1333	1.1333	1.1333	0.0000	0.0000	0.0000
1.8	1.2307	1.2293	1.2213	1.2197	-0.0015	-0.0095	-0.0001
1.6	1.3489	1.3440	1.3280	1.3225	-0.0052	-0.0212	-0.0003
1.4	1.4716	1.4601	1.4379	1.4251	-0.0122	-0.0344	-0.0007
1.2	1.6042	1.5818	1.5582	1.5331	-0.0238	-0.0474	-0.0013
1.0	1.7662	1.7266	1.7127	1.6669	-0.0427	-0.0566	-0.0031
0.8	2.0017	1.9333	1.9595	1.8753	-0.0763	-0.0501	-0.0079
0.6	2.4445	2.3128	2.5173	2.3275	-0.1608	0.0438	-0.0291
0.4	4.0195	3.5803	6.2792	5.2426	-0.7379	1.9610	-0.2987
0.2	8.1231	8.0970	8.1973	8.1955	-0.0139	0.0864	0.0122
0.0	7.9998	7.9998	8.0000	8.0000	-0.0000	0.0002	0.0000

TABLE 10.--Infiltration Rate, Main Effect, and Interactive Effect at Different Dimensionless Time Steps.

Parameter Varied	None	λ	P_b	λ & P_b			
τ	f_1	f_2	f_3	f_{12}	Effects of λ	Effects of P_b	Inter-action
0.005	1.2217	2.2992	1.2872	2.3056	1.0480	0.0360	-0.0295
0.020	0.7111	0.7878	0.7876	0.9779	0.1335	0.1333	0.0568
0.050	0.5553	0.4295	0.6195	0.6678	-0.0388	0.1513	0.0871
0.110	0.4734	0.2800	0.5264	0.5313	-0.0943	0.1522	0.0992
0.200	0.4321	0.2173	0.4765	0.4678	-0.1118	0.1475	0.1031
0.380	0.3992	0.1760	0.4353	0.4218	-0.1184	0.1410	0.1049
0.680	0.3818	0.1531	0.4102	0.3941	-0.1224	0.1347	0.1063
0.980	0.3783	0.1436	0.4004	0.3824	-0.1264	0.1305	0.1084
1.280	0.3774	0.1384	0.3947	0.3759	-0.1289	0.1274	0.1101
1.580	0.3771	0.1349	0.3909	0.3716	-0.1308	0.1253	0.1115
1.880	0.3771	0.1325	0.3880	0.3686	-0.1320	0.1235	0.1126

TABLE 10.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
τ	f_1	f_7	f_3	f_{13}	Effect of λ'	Effect of P_b	Inter-action
0.005	1.2217	1.6939	1.2872	1.6301	0.4075	0.0009	-0.0647
0.020	0.7111	0.8997	0.7876	0.9378	0.1694	0.0573	-0.0192
0.050	0.5553	0.6745	0.6195	0.7170	0.1083	0.0534	-0.0108
0.110	0.4734	0.5582	0.5264	0.5971	0.0777	0.0460	-0.0071
0.200	0.4321	0.4991	0.4765	0.5333	0.0619	0.0393	-0.0051
0.380	0.3992	0.4535	0.4353	0.4820	0.0505	0.0323	-0.0038
0.680	0.3818	0.4256	0.4102	0.4492	0.0414	0.0260	-0.0024
0.980	0.3783	0.4137	0.4004	0.4331	0.0340	0.0208	-0.0013
1.280	0.3774	0.4067	0.3947	0.4229	0.0287	0.0168	-0.0006
1.580	0.3771	0.4019	0.3909	0.4157	0.0248	0.0138	-0.0000
1.880	0.3771	0.3983	0.3880	0.4102	0.0217	0.0114	0.0005

TABLE 10.--Continued.

Parameter Varied	None	λ	S_r	λ & S_r			
τ	f_1	f_2	f_4	f_{15}	Effect of λ	Effect of S_r	Inter-action
0.005	1.2217	2.2992	1.0760	2.0586	1.0301	-0.1931	-0.0474
0.020	0.7111	0.7878	0.6407	0.7172	0.0766	-0.0705	-0.0001
0.050	0.5553	0.4295	0.5049	0.3962	-0.1173	-0.0419	0.0065
0.110	0.4734	0.2800	0.4338	0.2608	-0.1832	-0.0294	0.0102
0.200	0.4321	0.2173	0.3973	0.2036	-0.2043	-0.0242	0.0106
0.380	0.3992	0.1760	0.3685	0.1649	-0.2134	-0.0209	0.0098
0.680	0.3818	0.1531	0.3531	0.1432	-0.2193	-0.0193	0.0094
0.980	0.3783	0.1436	0.3499	0.1343	-0.2252	-0.0189	0.0096
1.280	0.3774	0.1384	0.3490	0.1294	-0.2293	-0.0187	0.0097
1.580	0.3771	0.1349	0.3487	0.1266	-0.2322	-0.0183	0.0100
1.880	0.3771	0.1325	0.3487	0.1240	-0.2347	-0.0184	0.0099

TABLE 10.--Continued.

Parameter Varied	None	λ	S_r'	λ & S_r'			
τ	f_1	f_2	f_9	f_{16}	Effect of λ	Effect of S_r'	Inter-action
0.005	1.2217	2.2992	1.3646	2.5274	1.1202	0.1856	0.0427
0.020	0.7111	0.7878	0.7765	0.8548	0.0775	0.0662	0.0008
0.050	0.5553	0.4295	0.6011	0.4582	-0.1344	0.0372	-0.0085
0.110	0.4734	0.2800	0.5084	0.2959	-0.2030	0.0254	-0.0096
0.200	0.4321	0.2173	0.4628	0.2287	-0.2245	0.0210	-0.0097
0.380	0.3992	0.1760	0.4259	0.1852	-0.2320	0.0180	-0.0088
0.680	0.3818	0.1531	0.4064	0.1612	-0.2370	0.0164	-0.0082
0.980	0.3783	0.1436	0.4023	0.1511	-0.2430	0.0157	-0.0082
1.280	0.3774	0.1384	0.4013	0.1454	-0.2475	0.0154	-0.0085
1.580	0.3771	0.1349	0.4010	0.1418	-0.2507	0.0154	-0.0085
1.880	0.3771	0.1325	0.4010	0.1392	-0.2532	0.0153	-0.0086

TABLE 10.--Continued.

Parameter Varied	None	λ'	S_r	λ' & S_r			
τ	f_1	f_7	f_4	f_{17}	Effect of λ'	Effect of S_r	Inter-action
0.005	1.2217	1.6939	1.0760	1.4888	0.4425	-0.1754	-0.0297
0.020	0.7111	0.8997	0.6407	0.8042	0.1761	-0.0830	-0.0125
0.050	0.5553	0.6745	0.5049	0.6078	0.1111	-0.0586	-0.0081
0.110	0.4734	0.5582	0.4338	0.5054	0.0782	-0.0462	-0.0066
0.200	0.4321	0.4991	0.3973	0.4531	0.0614	-0.0404	-0.0056
0.380	0.3992	0.4535	0.3685	0.4126	0.0492	-0.0358	-0.0051
0.680	0.3818	0.4256	0.3531	0.3877	0.0392	-0.0333	-0.0046
0.980	0.3783	0.4137	0.3499	0.3771	0.0313	-0.0325	-0.0041
1.280	0.3774	0.4067	0.3490	0.3707	0.0255	-0.0322	-0.0038
1.580	0.3771	0.4019	0.3487	0.3663	0.0212	-0.0320	-0.0036
1.880	0.3771	0.3983	0.3487	0.3631	0.0178	-0.0318	-0.0034

TABLE 10.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
τ	f_1	f_7	f_9	f_{18}	Effect of λ'	Effect of S_r'	Inter-action
0.005	1.2217	1.6939	1.3646	1.6948	0.5012	0.1719	0.0290
0.020	0.7111	0.8997	0.7765	0.9885	0.2003	0.0771	0.0117
0.050	0.5553	0.6745	0.6011	0.7349	0.1265	0.0531	0.0073
0.110	0.4734	0.5582	0.5084	0.6052	0.0908	0.0410	0.0060
0.200	0.4321	0.4991	0.4626	0.5397	0.0719	0.0356	0.0049
0.380	0.3992	0.4535	0.4259	0.4889	0.0587	0.0311	0.0044
0.680	0.3818	0.4256	0.4064	0.4582	0.0478	0.0286	0.0040
0.980	0.3783	0.4137	0.4023	0.4451	0.0391	0.0277	0.0037
1.280	0.3774	0.4067	0.4013	0.4375	0.0328	0.0274	0.0035
1.580	0.3771	0.4019	0.4010	0.4322	0.0280	0.0271	0.0032
1.880	0.3771	0.3983	0.4010	0.4222	0.0212	0.0239	0.0000

TABLE 10.--Continued.

Parameter Varied	None	λ'		λ' & η			
τ	f_1	f_7	f_5	f_{19}	Effect of λ'	Effect of η	Inter-action
0.005	1.2217	1.6939	1.7572	2.2756	0.4953	0.5586	0.0231
0.020	0.7111	0.8997	0.8760	1.1030	0.2068	0.1851	0.0182
0.050	0.5553	0.6745	0.6466	0.7775	0.1251	0.0972	0.0058
0.110	0.4734	0.5582	0.5287	0.6187	0.0874	0.0579	0.0026
0.200	0.4321	0.4991	0.4683	0.5404	0.0695	0.0387	0.0025
0.380	0.3992	0.4535	0.4226	0.4808	0.0563	0.0253	0.0019
0.680	0.3818	0.4256	0.3971	0.4444	0.0456	0.0171	0.0017
0.980	0.3783	0.4137	0.3896	0.4285	0.0371	0.0131	0.0018
1.280	0.3774	0.4067	0.3866	0.4192	0.0310	0.0109	0.0017
1.580	0.3771	0.4019	0.3846	0.4128	0.0265	0.0092	0.0017
1.880	0.3771	0.3983	0.3839	0.4081	0.0227	0.0083	0.0015

TABLE 10.--Continued.

Parameter Varied	None	λ	K_v	λ & K_v			
τ	f_1	f_2	f_6	f_{20}	Effect of λ	Effect of K_v	Inter-action
0.005	1.2217	2.2992	1.2201	2.2850	1.0712	-0.0079	-0.0063
0.020	0.7111	0.7878	0.7080	0.7822	0.0755	-0.0044	-0.0013
0.050	0.5553	0.4295	0.5512	0.4240	-0.1265	-0.0048	-0.0007
0.110	0.4734	0.2800	0.4681	0.2753	-0.1931	-0.0050	0.0003
0.200	0.4321	0.2173	0.4263	0.2131	-0.2140	-0.0050	0.0008
0.380	0.3992	0.1760	0.3924	0.1724	-0.2216	-0.0052	0.0016
0.680	0.3818	0.1531	0.3742	0.1497	-0.2266	-0.0055	0.0021
0.980	0.3783	0.1436	0.3700	0.1404	-0.2322	-0.0057	0.0026
1.280	0.3774	0.1384	0.3687	0.1350	-0.2364	-0.0060	0.0026
1.580	0.3771	0.1349	0.3681	0.1316	-0.2394	-0.0061	0.0029
1.880	0.3771	0.1325	0.3679	0.1292	-0.2417	-0.0063	0.0030

TABLE 10.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
τ	f_1	f_2	f_{11}	f_{21}	Effect of λ	Effect of K_v'	Inter-action
0.005	1.2217	2.2992	1.2233	2.3133	1.0838	0.0079	0.0062
0.020	0.7111	0.7878	0.7141	0.7952	0.0789	0.0052	0.0022
0.050	0.5553	0.4295	0.5593	0.4349	-0.1251	0.0047	0.0007
0.110	0.4734	0.2800	0.4787	0.2847	-0.1937	0.0050	-0.0003
0.200	0.4321	0.2173	0.4381	0.2216	-0.2157	0.0051	-0.0008
0.380	0.3992	0.1760	0.4062	0.1796	-0.2249	0.0053	-0.0017
0.680	0.3818	0.1531	0.3896	0.1564	-0.2310	0.0056	-0.0023
0.980	0.3783	0.1436	0.3866	0.1469	-0.2372	0.0058	-0.0025
1.280	0.3774	0.1384	0.3860	0.1416	-0.2417	0.0059	-0.0027
1.580	0.3771	0.1349	0.3860	0.1382	-0.2450	0.0061	-0.0028
1.880	0.3771	0.1325	0.3860	0.1359	-0.2474	0.0062	-0.0028

TABLE 10.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
τ	f_1	f_7	f_6	f_{22}	Effect of λ'	Effect of K_v	Inter-action
0.005	1.2217	1.6939	1.2201	0.6846	-0.0316	-0.5054	-0.5039
0.020	0.7111	0.8997	0.7080	0.6934	0.1870	-0.0047	-0.0016
0.050	0.5553	0.6745	0.5512	0.6679	0.1179	-0.0053	-0.0012
0.110	0.4734	0.5582	0.4681	0.5512	0.0840	-0.0062	-0.0008
0.200	0.4321	0.4991	0.4263	0.4917	0.0662	-0.0066	-0.0008
0.380	0.3992	0.4535	0.3924	0.4452	0.0536	-0.0075	-0.0008
0.680	0.3818	0.4256	0.3742	0.4167	0.0432	-0.0082	-0.0007
0.980	0.3783	0.4137	0.3700	0.4046	0.0350	-0.0087	-0.0004
1.280	0.3774	0.4067	0.3687	0.3972	0.0289	-0.0091	-0.0004
1.580	0.3771	0.4019	0.3681	0.3922	0.0245	-0.0094	-0.0004
1.880	0.3771	0.3983	0.3679	0.3885	0.0209	-0.0095	-0.0003

TABLE 10.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
τ	f_1	f_7	f_{11}	f_{23}	Effect of λ'	Effect of K_v'	Inter-action
0.005	1.2217	1.6939	1.2233	1.7031	0.4760	0.0054	0.0038
0.020	0.7111	0.8997	0.7141	0.9060	0.1903	0.0046	0.0016
0.050	0.5553	0.6745	0.5593	0.6812	0.1206	0.0054	0.0013
0.110	0.4734	0.5582	0.4787	0.5653	0.0857	0.0062	0.0009
0.200	0.4321	0.4991	0.4381	0.5066	0.0678	0.0067	0.0008
0.380	0.3992	0.4535	0.4062	0.4616	0.0549	0.0076	0.0006
0.680	0.3818	0.4256	0.3896	0.4341	0.0442	0.0082	0.0003
0.980	0.3783	0.4137	0.3866	0.4225	0.0356	0.0086	0.0003
1.280	0.3774	0.4067	0.3860	0.4157	0.0295	0.0088	0.0002
1.580	0.3771	0.4019	0.3860	0.4111	0.0250	0.0090	0.0001
1.880	0.3771	0.3983	0.3860	0.4078	0.0215	0.0092	0.0003

TABLE 10.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
τ	f_1	f_3	f_4	f_{24}	Effect of P_b	Effect of S_r	Inter-action
0.005	1.2217	1.2872	1.0760	1.1375	0.0635	-0.1477	-0.0020
0.020	0.7111	0.7876	0.6407	0.7102	0.0730	-0.0739	-0.0035
0.050	0.5553	0.6195	0.5049	0.5646	0.0619	-0.0527	-0.0023
0.110	0.4734	0.5264	0.4336	0.4822	0.0507	-0.0419	-0.0023
0.200	0.4321	0.4765	0.3973	0.4379	0.0425	-0.0367	-0.0019
0.380	0.3992	0.4353	0.3685	0.4010	0.0343	-0.0325	-0.0018
0.680	0.3818	0.4102	0.3531	0.3787	0.0270	-0.0301	-0.0014
0.980	0.3783	0.4004	0.3499	0.3698	0.0210	-0.0295	-0.0011
1.280	0.3774	0.3947	0.3490	0.3646	0.0165	-0.0292	-0.0009
1.580	0.3771	0.3909	0.3487	0.3611	0.0131	-0.0291	-0.0007
1.880	0.3771	0.3880	0.3487	0.3585	0.0104	-0.0289	-0.0006

TABLE 10.--Continued.

Parameter Varied	None	P_b	S_r'	P_b & S_r'			
τ	f_1	f_3	f_9	f_{25}	Effect of P_b	Effect of S_r'	Inter-action
0.005	1.2217	1.2872	1.3646	1.4334	0.0672	0.1445	0.0016
0.020	0.7111	0.7876	0.7765	0.6601	0.0801	0.0690	0.0035
0.050	0.5553	0.6195	0.6011	0.6693	0.0662	0.0478	0.0020
0.110	0.4734	0.5264	0.5084	0.5655	0.0550	0.0370	0.0020
0.200	0.4321	0.4765	0.4628	0.5102	0.0459	0.0322	0.0015
0.380	0.3992	0.4353	0.4259	0.4649	0.0376	0.0282	0.0015
0.680	0.3818	0.4102	0.4064	0.4370	0.0295	0.0257	0.0011
0.980	0.3783	0.4004	0.4023	0.4264	0.0231	0.0250	0.0010
1.280	0.3774	0.3947	0.4013	0.4203	0.0182	0.0247	0.0008
1.580	0.3771	0.3909	0.4010	0.4161	0.0145	0.0246	0.0006
1.880	0.3771	0.3880	0.4010	0.4130	0.0115	0.0244	0.0005

TABLE 10.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
τ	f_1	f_8	f_4	f_{26}	Effect of P_b'	Effect of S_r	Inter-action
0.005	1.2217	1.1548	1.0760	1.0170	-0.0629	-0.1417	0.0039
0.020	0.7111	0.6171	0.6407	0.5568	-0.0890	-0.0654	0.0050
0.050	0.5553	0.4853	0.5049	0.4418	-0.0665	-0.0469	0.0035
0.110	0.4734	0.4184	0.4338	0.3827	-0.0531	-0.0377	0.0019
0.200	0.4321	0.3879	0.3973	0.3569	-0.0423	-0.0329	0.0019
0.380	0.3992	0.3640	0.3685	0.3359	-0.0339	-0.0294	0.0013
0.680	0.3818	0.3545	0.3531	0.3281	-0.0261	-0.0275	0.0012
0.980	0.3783	0.3545	0.3499	0.3281	-0.0228	-0.0274	0.0010
1.280	0.3774	0.3545	0.3490	0.3281	-0.0219	-0.0274	0.0010
1.580	0.3771	0.3545	0.3487	0.3281	-0.0216	-0.0274	0.0010
1.880	0.3771	0.3545	0.3487	0.3281	-0.0216	-0.0274	0.0010

TABLE 10.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
τ	f_1	f_8	f_9	f_{27}	Effect of P_b'	Effect of S_r'	Inter-action
0.005	1.2217	1.1548	1.3646	1.2978	-0.0668	0.1430	0.0000
0.020	0.7111	0.6171	0.7765	0.6730	-0.0988	0.0607	-0.0047
0.050	0.5553	0.4853	0.6011	0.5244	-0.0734	0.0424	-0.0033
0.110	0.4734	0.4184	0.5084	0.4501	-0.0567	0.0333	-0.0017
0.200	0.4321	0.3879	0.4628	0.1146	-0.1962	-0.1213	-0.1520
0.380	0.3992	0.3640	0.4259	0.3879	-0.0366	0.0253	-0.0014
0.680	0.3818	0.3545	0.4064	0.3769	-0.0284	0.0235	-0.0011
0.980	0.3783	0.3545	0.4023	0.3769	-0.0246	0.0232	-0.0008
1.280	0.3774	0.3545	0.4013	0.3769	-0.0237	0.0232	-0.0008
1.580	0.3771	0.3545	0.4010	0.3769	-0.0234	0.0232	-0.0008
1.880	0.3771	0.3545	0.4010	0.3769	-0.0234	0.0232	-0.0008

TABLE 10.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
τ	f_1	f_3	f_5	f_{28}	Effect of P_b	Effect of η	Inter-action
0.005	1.2217	1.2872	1.7572	1.8189	0.0636	0.5336	-0.0019
0.020	0.7111	0.7876	0.8780	0.9754	0.0870	0.1773	0.0104
0.050	0.5553	0.6195	0.6466	0.7205	0.0690	0.0961	0.0046
0.110	0.4734	0.5264	0.5287	0.5858	0.0551	0.0574	0.0021
0.200	0.4321	0.4765	0.4683	0.5173	0.0467	0.0385	0.0023
0.380	0.3992	0.4353	0.4226	0.4629	0.0382	0.0255	0.0021
0.680	0.3818	0.4102	0.3971	0.4299	0.0306	0.0175	0.0022
0.980	0.3783	0.4004	0.3896	0.4155	0.0240	0.0132	0.0019
1.280	0.3774	0.3947	0.3866	0.4075	0.0191	0.0110	0.0018
1.580	0.3771	0.3909	0.3846	0.4021	0.0157	0.0093	0.0018
1.880	0.3771	0.3880	0.3839	0.3981	0.0126	0.0085	0.0016

TABLE 10.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
τ	f_1	f_3	f_{10}	f_{29}	Effect of P_b	Effect of η'	Inter-action
0.005	1.2217	1.2872	0.6493	0.7136	0.0649	-0.5730	-0.0006
0.020	0.7111	0.7876	0.4899	0.5664	0.0765	-0.2212	0.0000
0.050	0.5553	0.6195	0.4415	0.4988	0.0608	-0.1173	-0.0035
0.110	0.4734	0.5264	0.4082	0.4536	0.0492	-0.0690	-0.0038
0.200	0.4321	0.4765	0.3899	0.4265	0.0405	-0.0461	-0.0039
0.380	0.3992	0.4353	0.3731	0.4023	0.0326	-0.0295	-0.0035
0.680	0.3818	0.4102	0.3656	0.3879	0.0254	-0.0193	-0.0031
0.980	0.3783	0.4004	0.3656	0.3831	0.0198	-0.0150	-0.0023
1.280	0.3774	0.3947	0.3656	0.3802	0.0160	-0.0132	-0.0014
1.580	0.3771	0.3909	0.3656	0.3784	0.0133	-0.0120	-0.0005
1.880	0.3771	0.3880	0.3656	0.3769	0.0111	-0.0113	0.0002

TABLE 10.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
τ	f_1	f_3	f_6	f_{30}	Effect of P_b	Effect of K_v	Inter-action
0.005	1.2217	1.2872	1.2201	1.2850	0.0652	-0.0019	-0.0003
0.020	0.7111	0.7876	0.7080	0.7838	0.0762	-0.0035	-0.0003
0.050	0.5553	0.6195	0.5512	0.6142	0.0636	-0.0047	-0.0006
0.110	0.4734	0.5264	0.4681	0.5201	0.0525	-0.0058	-0.0005
0.200	0.4321	0.4765	0.4263	0.4695	0.0438	-0.0064	-0.0006
0.380	0.3992	0.4353	0.3924	0.4276	0.0356	-0.0072	-0.0004
0.680	0.3818	0.4102	0.3742	0.4015	0.0279	-0.0081	-0.0006
0.980	0.3783	0.4004	0.3700	0.3912	0.0216	-0.0088	-0.0005
1.280	0.3774	0.3947	0.3687	0.3851	0.0169	-0.0091	-0.0005
1.580	0.3771	0.3909	0.3681	0.3810	0.0134	-0.0095	-0.0005
1.880	0.3771	0.3880	0.3679	0.3780	0.0105	-0.0096	-0.0004

TABLE 10.--Continued

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
τ	f_1	f_3	f_{11}	f_{31}	Effect of P_b	Effect of K_v'	Inter-action
0.005	1.2217	1.2872	1.2233	1.2894	0.0658	0.0019	0.0003
0.020	0.7111	0.7876	0.7141	0.7914	0.0769	0.0034	0.0004
0.050	0.5553	0.6195	0.5593	0.6248	0.0649	0.0046	0.0006
0.110	0.4734	0.5264	0.4787	0.5326	0.0535	0.0057	0.0005
0.200	0.4321	0.4765	0.4381	0.4835	0.0449	0.0065	0.0005
0.380	0.3992	0.4353	0.4062	0.4429	0.0364	0.0073	0.0003
0.680	0.3818	0.4102	0.3896	0.4186	0.0287	0.0081	0.0003
0.980	0.3783	0.4004	0.3866	0.4093	0.0224	0.0086	0.0003
1.280	0.3774	0.3947	0.3860	0.4040	0.0177	0.0090	0.0003
1.580	0.3771	0.3909	0.3860	0.4004	0.0141	0.0092	0.0003
1.880	0.3771	0.3880	0.3860	0.3978	0.0114	0.0094	0.0004

TABLE 10.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
τ	f_1	f_8	f_{11}	f_{32}	Effects of P_b'	Effect of K_v'	Inter-action
0.005	1.2217	1.1548	1.2233	1.1595	-0.0653	0.0031	0.0015
0.020	0.7111	0.6171	0.7141	0.6197	-0.0942	0.0028	-0.0002
0.050	0.5553	0.4853	0.5593	0.4887	-0.0703	0.0037	-0.0003
0.110	0.4734	0.4184	0.4767	0.4221	-0.0558	0.0045	-0.0008
0.200	0.4321	0.3879	0.4381	0.3927	-0.0448	0.0054	-0.0006
0.380	0.3992	0.3640	0.4062	0.3691	-0.0361	0.0060	-0.0009
0.680	0.3818	0.3545	0.3896	0.3683	-0.0243	0.0108	0.0030
0.980	0.3783	0.3545	0.3866	0.3083	-0.0511	-0.0169	-0.0272
1.280	0.3774	0.3545	0.3860	0.3683	-0.0203	0.0112	0.0026
1.580	0.3771	0.3545	0.3860	0.3683	-0.0202	0.0114	0.0024
1.880	0.3771	0.3545	0.3860	0.3683	-0.0202	0.0114	0.0024

TABLE 10.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
τ	f_1	f_4	f_5	f_{33}	Effect of S_r	Effect of η	Inter-action
0,005	1,2217	1,0760	1,7572	1,5439	-0,1795	0,5017	-0,0338
0,020	0,7111	0,6407	0,8780	0,7912	-0,0786	0,1587	-0,0082
0,050	0,5553	0,5049	0,6466	0,5875	-0,0548	0,0870	-0,0044
0,110	0,4734	0,4338	0,5287	0,4830	-0,0427	0,0523	-0,0031
0,200	0,4321	0,3973	0,4683	0,4297	-0,0367	0,0343	-0,0019
0,380	0,3992	0,3685	0,4226	0,3893	-0,0320	0,0221	-0,0013
0,680	0,3818	0,3531	0,3971	0,3665	-0,0296	0,0144	-0,0010
0,980	0,3783	0,3499	0,3896	0,3600	-0,0290	0,0107	-0,0006
1,280	0,3774	0,3490	0,3866	0,3572	-0,0289	0,0087	-0,0005
1,580	0,3771	0,3487	0,3846	0,3556	-0,0287	0,0072	-0,0003
1,880	0,3771	0,3487	0,3839	0,3547	-0,0288	0,0064	-0,0004

TABLE 10.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
τ	f_1	f_9	f_5	f_{35}	Effect of S_r'	Effect of η	Inter-action
0,005	1,2217	1,3646	1,7572	1,9670	0,1764	0,5690	0,0335
0,020	0,7111	0,7765	0,8780	0,9588	0,0731	0,1746	0,0077
0,050	0,5553	0,6011	0,6466	0,7004	0,0498	0,0953	0,0040
0,110	0,4734	0,5084	0,5287	0,5692	0,0378	0,0581	0,0027
0,200	0,4321	0,4628	0,4683	0,5024	0,0324	0,0379	0,0017
0,380	0,3992	0,4259	0,4226	0,4517	0,0279	0,0246	0,0012
0,680	0,3818	0,4064	0,3971	0,4233	0,0254	0,0161	0,0008
0,980	0,3783	0,4023	0,3896	0,4150	0,0247	0,0120	0,0007
1,280	0,3774	0,4013	0,3866	0,4115	0,0244	0,0097	0,0005
1,580	0,3771	0,4010	0,3846	0,4097	0,0245	0,0081	0,0006
1,880	0,3771	0,4010	0,3839	0,4086	0,0243	0,0072	0,0004

TABLE 10.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
τ	f_1	f_4	f_{10}	f_{34}	Effect of S_r	Effect of η'	Inter-action
0,005	1,2217	1,0760	0,6493	0,5755	-0,1097	-0,5365	0,0359
0,020	0,7111	0,6407	0,4899	0,4448	-0,0578	-0,2086	0,0126
0,050	0,5553	0,5049	0,4415	0,4039	-0,0440	-0,1074	0,0064
0,110	0,4734	0,4338	0,4082	0,3755	-0,0361	-0,0618	0,0035
0,200	0,4321	0,3973	0,3899	0,3598	-0,0324	-0,0399	0,0023
0,380	0,3992	0,3685	0,3731	0,3449	-0,0295	-0,0248	0,0012
0,680	0,3818	0,3531	0,3656	0,3387	-0,0278	-0,0153	0,0009
0,980	0,3783	0,3499	0,3656	0,3387	-0,0277	-0,0120	0,0008
1,280	0,3774	0,3490	0,3656	0,3387	-0,0276	-0,0111	0,0008
1,560	0,3771	0,3487	0,3656	0,3387	-0,0276	-0,0108	0,0008
1,880	0,3771	0,3467	0,3656	0,3387	-0,0276	-0,0108	0,0008

TABLE 10.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
τ	f_1	f_4	f_6	f_{36}	Effect of S_r	Effect of K_v	Inter-action
0,005	1,2217	1,0760	1,2201	1,0746	-0,1456	-0,0015	0,0001
0,020	0,7111	0,6407	0,7080	0,6378	-0,0703	-0,0030	0,0001
0,050	0,5553	0,5049	0,5512	0,5011	-0,0503	-0,0040	0,0001
0,110	0,4734	0,4338	0,4681	0,4288	-0,0395	-0,0052	0,0001
0,200	0,4321	0,3973	0,4263	0,3917	-0,0347	-0,0057	0,0001
0,380	0,3992	0,3685	0,3924	0,3619	-0,0306	-0,0067	0,0001
0,680	0,3818	0,3531	0,3742	0,3458	-0,0286	-0,0075	0,0001
0,980	0,3783	0,3499	0,3700	0,3420	-0,0282	-0,0081	0,0002
1,280	0,3774	0,3490	0,3687	0,3408	-0,0282	-0,0084	0,0002
1,580	0,3771	0,3487	0,3681	0,3403	-0,0281	-0,0087	0,0003
1,880	0,3771	0,3487	0,3679	0,3400	-0,0281	-0,0090	0,0003

TABLE 10.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
τ	f_1	f_4	f_{11}	f_{37}	Effect of S_r	Effect of K_v'	Inter-action
0.005	1.2217	1.0760	1.2233	1.0775	-0.1457	0.0016	-0.0001
0.020	0.7111	0.6407	0.7141	0.6433	-0.0706	0.0028	-0.0002
0.050	0.5553	0.5049	0.5593	0.5087	-0.0505	0.0039	-0.0001
0.110	0.4734	0.4338	0.4787	0.4388	-0.0397	0.0051	-0.0001
0.200	0.4321	0.3973	0.4381	0.4030	-0.0349	0.0058	-0.0001
0.380	0.3992	0.3685	0.4062	0.3750	-0.0309	0.0067	-0.0003
0.680	0.3818	0.3531	0.3896	0.3602	-0.0291	0.0075	-0.0004
0.980	0.3783	0.3499	0.3866	0.3576	-0.0287	0.0080	-0.0003
1.280	0.3774	0.3490	0.3860	0.3570	-0.0287	0.0083	-0.0003
1.580	0.3771	0.3487	0.3860	0.3570	-0.0287	0.0086	-0.0003
1.880	0.3771	0.3487	0.3860	0.3570	-0.0287	0.0086	-0.0003

TABLE 10.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
τ	f_1	f_9	f_6	f_{38}	Effect of S_r'	Effect of K_v	Inter-action
0.005	1.2217	1.3646	1.2201	1.3628	0.1428	-0.0017	-0.0001
0.020	0.7111	0.7765	0.7080	0.7731	0.0652	-0.0032	-0.0002
0.050	0.5553	0.6011	0.5512	0.5967	0.0456	-0.0042	-0.0002
0.110	0.4734	0.5084	0.4681	0.5030	0.0350	-0.0054	-0.0000
0.200	0.4321	0.4628	0.4263	0.4568	0.0306	-0.0059	-0.0001
0.380	0.3992	0.4259	0.3924	0.4190	0.0266	-0.0068	-0.0001
0.680	0.3818	0.4064	0.3742	0.3985	0.0244	-0.0077	-0.0002
0.980	0.3783	0.4023	0.3700	0.3937	0.0238	-0.0084	-0.0001
1.280	0.3774	0.4013	0.3687	0.3922	0.0237	-0.0069	-0.0002
1.580	0.3771	0.4010	0.3681	0.3916	0.0237	-0.0092	-0.0002
1.880	0.3771	0.4010	0.3679	0.3913	0.0237	-0.0095	-0.0003

TABLE 10.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
τ	f_1	f_9	f_{11}	f_{39}	Effect of S_r'	Effect of K_v'	Inter-action
0.005	1.2217	1.3646	1.2233	1.3663	0.1430	0.0016	0.0000
0.020	0.7111	0.7765	0.7141	0.7799	0.0656	0.0032	0.0002
0.050	0.5553	0.6011	0.5593	0.6054	0.0459	0.0042	0.0001
0.110	0.4734	0.5084	0.4787	0.5140	0.0352	0.0054	0.0001
0.200	0.4321	0.4628	0.4381	0.4689	0.0307	0.0060	0.0001
0.380	0.3992	0.4259	0.4062	0.4331	0.0268	0.0071	0.0001
0.680	0.3818	0.4064	0.3896	0.4144	0.0247	0.0079	0.0001
0.980	0.3783	0.4023	0.3866	0.4110	0.0242	0.0085	0.0002
1.280	0.3774	0.4013	0.3860	0.4104	0.0242	0.0089	0.0003
1.580	0.3771	0.4010	0.3860	0.4103	0.0241	0.0091	0.0002
1.880	0.3771	0.4010	0.3860	0.4103	0.0241	0.0091	0.0002

TABLE 10.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
τ	f_1	f_5	f_6	f_{40}	Effect of η	Effect of K_v	Inter-action
0.005	1.2217	1.7572	1.2201	1.7552	0.5353	-0.0018	-0.0002
0.020	0.7111	0.8780	0.7080	0.8742	0.1666	-0.0035	-0.0003
0.050	0.5553	0.6466	0.5512	0.6421	0.0911	-0.0043	-0.0002
0.110	0.4734	0.5287	0.4681	0.5236	0.0554	-0.0052	0.0001
0.200	0.4321	0.4683	0.4263	0.4627	0.0363	-0.0057	0.0001
0.380	0.3992	0.4226	0.3924	0.4163	0.0237	-0.0065	0.0003
0.680	0.3818	0.3971	0.3742	0.3899	0.0155	-0.0074	0.0002
0.980	0.3783	0.3896	0.3700	0.3819	0.0116	-0.0080	0.0003
1.280	0.3774	0.3866	0.3687	0.3783	0.0094	-0.0085	0.0002
1.580	0.3771	0.3846	0.3681	0.3763	0.0079	-0.0086	0.0004
1.880	0.3771	0.3839	0.3679	0.3751	0.0070	-0.0090	0.0002

TABLE 10.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
τ	f_1	f_5	f_{11}	f_{41}	Effect of η	Effect of K_v'	Inter-action
0.005	1.2217	1.7572	1.2233	1.7593	0.5358	0.0019	0.0003
0.020	0.7111	0.8780	0.7141	0.8813	0.1671	0.0031	0.0002
0.050	0.5553	0.6466	0.5593	0.6510	0.0915	0.0042	0.0002
0.110	0.4734	0.5287	0.4787	0.5337	0.0551	0.0051	-0.0002
0.200	0.4321	0.4683	0.4381	0.4739	0.0360	0.0058	-0.0002
0.380	0.3992	0.4226	0.4062	0.4290	0.0231	0.0067	-0.0003
0.680	0.3818	0.3971	0.3896	0.4041	0.0149	0.0074	-0.0004
0.980	0.3783	0.3896	0.3866	0.3975	0.0111	0.0081	-0.0002
1.280	0.3774	0.3866	0.3860	0.3948	0.0090	0.0084	-0.0002
1.580	0.3771	0.3846	0.3860	0.3934	0.0075	0.0089	-0.0000
1.880	0.3771	0.3839	0.3860	0.3926	0.0067	0.0088	-0.0001

TABLE 10.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
τ	f_1	f_{10}	f_6	f_{42}	Effect of η'	Effect of K_v	Inter-action
0.005	1.2217	0.6493	1.2201	0.6482	-0.5722	-0.0013	0.0002
0.020	0.7111	0.4899	0.7080	0.4670	-0.2211	-0.0030	0.0001
0.050	0.5553	0.4415	0.5512	0.4371	-0.1140	-0.0043	-0.0002
0.110	0.4734	0.4082	0.4681	0.4026	-0.0654	-0.0055	-0.0001
0.200	0.4321	0.3899	0.4263	0.3833	-0.0426	-0.0062	-0.0004
0.380	0.3992	0.3731	0.3924	0.3659	-0.0263	-0.0070	-0.0002
0.680	0.3818	0.3656	0.3742	0.3575	-0.0165	-0.0078	-0.0003
0.980	0.3783	0.3656	0.3700	0.3577	-0.0125	-0.0081	0.0002
1.280	0.3774	0.3656	0.3687	0.3577	-0.0114	-0.0083	0.0004
1.580	0.3771	0.3656	0.3681	0.3577	-0.0109	-0.0084	0.0006

TABLE 11.--Volume of Water Applied, Main Effect, and Interactive Effect at Different Dimensionless Time Steps.

Parameter Varied	None	λ	P_b	λ & P_b			
τ	W_1	W_2	W_3	W_{12}	Effect of λ	Effect of P_b	Inter-action
0.005	0.0061	0.0114	0.0064	0.0115	0.0052	0.0002	-0.0001
0.020	0.0142	0.0157	0.0157	0.0195	0.0027	0.0027	0.0012
0.050	0.0277	0.0214	0.0309	0.0333	-0.0019	0.0075	0.0044
0.110	0.0520	0.0308	0.0579	0.0584	-0.0104	0.0168	0.0108
0.200	0.0864	0.0434	0.0953	0.0935	-0.0224	0.0295	0.0206
0.380	0.1517	0.0668	0.1654	0.1602	-0.0450	0.0536	0.0399
0.680	0.2596	0.1040	0.2789	0.2679	-0.0833	0.0916	0.0723
0.980	0.3707	0.1407	0.3924	0.3747	-0.1239	0.1279	0.1061
1.280	0.4830	0.1770	0.5052	0.4811	-0.1650	0.1632	0.1410
1.580	0.5957	0.2131	0.6175	0.5871	-0.2065	0.1979	0.1761
1.880	0.7089	0.2491	0.7295	0.6929	-0.2482	0.2322	0.2116

TABLE 11.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
τ	W_1	W_7	W_3	W_{13}	Effect of λ'	Effect of P_b	Inter-action
0.005	0.0061	0.0084	0.0064	0.0081	0.0020	0.0000	-0.0003
0.020	0.0142	0.0179	0.0157	0.0187	0.0034	0.0011	-0.0003
0.050	0.0277	0.0337	0.0309	0.0358	0.0055	0.0027	-0.0005
0.110	0.0520	0.0614	0.0579	0.0656	0.0086	0.0050	-0.0009
0.200	0.0864	0.0998	0.0953	0.1066	0.0124	0.0079	-0.0011
0.380	0.1517	0.1723	0.1654	0.1831	0.0192	0.0122	-0.0014
0.680	0.2596	0.2893	0.2789	0.3054	0.0281	0.0177	-0.0016
0.980	0.3707	0.4054	0.3924	0.4244	0.0333	0.0204	-0.0014
1.280	0.4830	0.5205	0.5052	0.5412	0.0368	0.0214	-0.0007
1.580	0.5957	0.6349	0.6175	0.6567	0.0392	0.0218	0.0000
1.880	0.7089	0.7488	0.7295	0.7711	0.0408	0.0215	0.0008

TABLE 11.--Continued.

Parameter Varied	None	λ	S_r	λ & S_r			
τ	W_1	W_2	W_4	W_{15}	Effect of λ	Effect of S_r	Inter-action
0.005	0.0061	0.0114	0.0053	0.0102	0.0051	-0.0010	-0.0002
0.020	0.0142	0.0157	0.0128	0.0143	0.0015	-0.0014	0.0000
0.050	0.0277	0.0214	0.0252	0.0198	-0.0059	-0.0021	0.0005
0.110	0.0520	0.0308	0.0477	0.0286	-0.0202	-0.0032	0.0010
0.200	0.0864	0.0434	0.0794	0.0407	-0.0409	-0.0048	0.0021
0.380	0.1517	0.0668	0.1400	0.0626	-0.0812	-0.0080	0.0038
0.680	0.2596	0.1040	0.2400	0.0973	-0.1491	-0.0131	0.0065
0.980	0.3707	0.1407	0.3428	0.1315	-0.2207	-0.0185	0.0093
1.280	0.4830	0.1770	0.4467	0.1656	-0.2936	-0.0238	0.0125
1.580	0.5957	0.2131	0.5509	0.1993	-0.3671	-0.0293	0.0155
1.880	0.7089	0.2491	0.6554	0.2331	-0.4411	-0.0348	0.0187

Parameter Varied	None	λ'	S_r	λ' & S_r			
τ	W_1	W_7	W_4	W_{17}	Effect of λ'	Effect of S_r	Inter-action
0.005	0.0061	0.0084	0.0053	0.0074	0.0022	-0.0009	-0.0001
0.020	0.0142	0.0179	0.0128	0.0160	0.0035	-0.0016	-0.0002
0.050	0.0277	0.0337	0.0252	0.0303	0.0055	-0.0030	-0.0005
0.110	0.0520	0.0614	0.0477	0.0555	0.0086	-0.0051	-0.0008
0.200	0.0864	0.0998	0.0794	0.0906	0.0123	-0.0081	-0.0011
0.380	0.1517	0.1723	0.1400	0.1567	0.0187	-0.0137	-0.0019
0.680	0.2596	0.2893	0.2400	0.2636	0.0267	-0.0226	-0.0031
0.980	0.3707	0.4054	0.3428	0.3695	0.0307	-0.0319	-0.0040
1.280	0.4830	0.5205	0.4467	0.4744	0.0326	-0.0412	-0.0049
1.580	0.5957	0.6349	0.5509	0.5787	0.0335	-0.0505	-0.0057
1.880	0.7089	0.7488	0.6554	0.6825	0.0335	-0.0599	-0.0064

TABLE 11.--Continued.

Parameter Varied	None	λ	S_r'	λ & S_r'			
τ	W_1	W_2	W_9	W_{16}	Effect of λ	Effect of S_r'	Inter-action
0.005	0.0061	0.0114	0.0068	0.0126	0.0056	0.0009	0.0003
0.020	0.0142	0.0157	0.0155	0.0170	0.0015	0.0013	0.0000
0.050	0.0277	0.0214	0.0300	0.0229	-0.0067	0.0019	-0.0004
0.110	0.0520	0.0308	0.0559	0.0325	-0.0223	0.0028	-0.0011
0.200	0.0864	0.0434	0.0925	0.0457	-0.0449	0.0042	-0.0019
0.380	0.1517	0.0668	0.1618	0.0703	-0.0882	0.0068	-0.0033
0.680	0.2596	0.1040	0.2763	0.1095	-0.1612	0.0111	-0.0056
0.980	0.3707	0.1407	0.3942	0.1481	-0.2381	0.0155	-0.0081
1.280	0.4830	0.1770	0.5136	0.1861	-0.3168	0.0199	-0.0107
1.580	0.5957	0.2131	0.6335	0.2240	-0.3960	0.0243	-0.0135
1.880	0.7089	0.2491	0.7538	0.2616	-0.4760	0.0287	-0.0162

TABLE 11.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
τ	W_1	W_7	W_9	W_{18}	Effect of λ'	Effect of S_r'	Inter-action
0.005	0.0061	0.0084	0.0068	0.0094	0.0025	0.0009	0.0002
0.020	0.0142	0.0179	0.0155	0.0197	0.0040	0.0016	0.0003
0.050	0.0277	0.0337	0.0300	0.0367	0.0064	0.0027	0.0004
0.110	0.0520	0.0614	0.0559	0.0665	0.0100	0.0045	0.0006
0.200	0.0864	0.0998	0.0925	0.1079	0.0144	0.0071	0.0010
0.380	0.1517	0.1723	0.1618	0.1857	0.0223	0.0117	0.0017
0.680	0.2596	0.2893	0.2763	0.3115	0.0325	0.0194	0.0027
0.980	0.3707	0.4054	0.3942	0.4362	0.0383	0.0272	0.0036
1.280	0.4830	0.5205	0.5136	0.5599	0.0419	0.0350	0.0044
1.580	0.5957	0.6349	0.6335	0.6899	0.0478	0.0464	0.0086
1.880	0.7089	0.7488	0.7538	0.8054	0.0457	0.0508	0.0058

TABLE 11.--Continued.

Parameter Varied	None	λ'	η	λ' & η			
τ	W_1	W_7	W_5	W_{19}	Effect of λ'	Effect of η	Inter-action
0.005	0.0061	0.0084	0.0087	0.0113	0.0025	0.0028	0.0001
0.020	0.0142	0.0179	0.0175	0.0220	0.0041	0.0037	0.0004
0.050	0.0277	0.0337	0.0323	0.0388	0.0062	0.0049	0.0003
0.110	0.0520	0.0614	0.0581	0.0680	0.0097	0.0064	0.0002
0.200	0.0864	0.0998	0.0936	0.1080	0.0139	0.0077	0.0005
0.380	0.1517	0.1723	0.1605	0.1827	0.0214	0.0096	0.0008
0.680	0.2596	0.2893	0.2699	0.3022	0.0310	0.0116	0.0013
0.980	0.3707	0.4054	0.3818	0.4199	0.0364	0.0128	0.0017
1.280	0.4830	0.5205	0.4947	0.5365	0.0397	0.0138	0.0022
1.580	0.5957	0.6349	0.6081	0.6522	0.0417	0.0149	0.0024
1.880	0.7089	0.7488	0.7217	0.7672	0.0427	0.0156	0.0026

TABLE 11.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
τ	W_1	W_2	W_{11}	W_{21}	Effect of λ	Effect of K_v'	Inter-action
0.005	0.0061	0.0114	0.0061	0.0115	0.0053	0.0001	0.0001
0.020	0.0142	0.0157	0.0142	0.0159	0.0016	0.0001	0.0001
0.050	0.0277	0.0214	0.0279	0.0217	-0.0063	0.0002	0.0000
0.110	0.0520	0.0308	0.0526	0.0313	-0.0213	0.0006	-0.0000
0.200	0.0864	0.0434	0.0876	0.0443	-0.0432	0.0011	-0.0001
0.380	0.1517	0.0668	0.1543	0.0682	-0.0855	0.0020	-0.0006
0.680	0.2596	0.1040	0.2649	0.1063	-0.1571	0.0038	-0.0015
0.980	0.3707	0.1407	0.3788	0.1439	-0.2325	0.0057	-0.0025
1.280	0.4830	0.1770	0.4941	0.1812	-0.3095	0.0077	-0.0034
1.580	0.5957	0.2131	0.6099	0.2183	-0.3871	0.0097	-0.0045
1.880	0.7089	0.2491	0.7260	0.2554	-0.4652	0.0117	-0.0054

TABLE 11.--Continued.

Parameter Varied	None	λ	K_v	λ & K_v			
τ	W_1	W_2	W_6	W_{20}	Effect of λ	Effect of K_v	Inter-action
0.005	0.0061	0.0114	0.0061	0.0114	0.0053	0.0000	0.0000
0.020	0.0142	0.0157	0.0141	0.0156	0.0015	-0.0001	-0.0000
0.050	0.0277	0.0214	0.0275	0.0212	-0.0063	-0.0002	0.0000
0.110	0.0520	0.0308	0.0514	0.0302	-0.0212	-0.0006	-0.0000
0.200	0.0864	0.0434	0.0852	0.0426	-0.0428	-0.0010	0.0002
0.380	0.1517	0.0668	0.1491	0.0656	-0.0842	-0.0019	0.0007
0.680	0.2596	0.1040	0.2544	0.1018	-0.1541	-0.0037	0.0015
0.980	0.3707	0.1407	0.3626	0.1375	-0.2275	-0.0056	0.0024
1.280	0.4830	0.1770	0.4719	0.1728	-0.3026	-0.0076	0.0035
1.580	0.5957	0.2131	0.5816	0.2078	-0.3782	-0.0097	0.0044
1.880	0.7089	0.2491	0.6916	0.2428	-0.4543	-0.0118	0.0055

TABLE 11.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
τ	W_1	W_7	W_6	S_{22}	Effects of λ'	Effects of K_v	Inter-action
0.005	0.0061	0.0084	0.0061	0.5084	0.2523	0.2500	0.2500
0.020	0.0142	0.0179	0.0141	0.6197	0.3047	0.3009	0.3010
0.050	0.0277	0.0337	0.0275	0.7304	0.3545	0.3483	0.3485
0.110	0.0520	0.0614	0.0514	0.0000	-0.0210	-0.0310	-0.0304
0.200	0.0864	0.0998	0.0852	0.0000	-0.0359	-0.0505	-0.0493
0.380	0.1517	0.1723	0.1491	0.0000	-0.0643	-0.0875	-0.0849
0.680	0.2596	0.2893	0.2544	0.0000	-0.1123	-0.1473	-0.1421
0.980	0.3707	0.4054	0.3626	0.0000	-0.1640	-0.2067	-0.1987
1.280	0.4830	0.5205	0.4719	0.0084	-0.2130	-0.2616	-0.2505
1.580	0.5957	0.6349	0.5816	0.0178	-0.2623	-0.3156	-0.3015
1.880	0.7089	0.7488	0.6916	0.0333	-0.3092	-0.3664	-0.3491

TABLE 11.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
τ	W_1	W_7	W_{11}	W_{23}	Effects of λ'	Effects of K_v'	Inter-action
0.005	0.0061	0.0084	0.0061	0.0085	0.0024	0.0001	0.0001
0.020	0.0142	0.0179	0.0142	0.0181	0.0038	0.0001	0.0001
0.050	0.0277	0.0337	0.0279	0.0340	0.0060	0.0003	0.0001
0.110	0.0520	0.0614	0.0526	0.0621	0.0095	0.0007	0.0000
0.200	0.0864	0.0998	0.0876	0.1013	0.0136	0.0014	0.0001
0.380	0.1517	0.1723	0.1543	0.1754	0.0208	0.0028	0.0003
0.680	0.2596	0.2893	0.2649	0.2951	0.0300	0.0055	0.0002
0.980	0.3707	0.4054	0.3788	0.4140	0.0350	0.0084	0.0003
1.280	0.4830	0.5205	0.4941	0.5321	0.0377	0.0113	0.0003
1.580	0.5957	0.6349	0.6099	0.6496	0.0394	0.0145	0.0003
1.880	0.7089	0.7488	0.7260	0.7666	0.0403	0.0175	0.0004

TABLE 11.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
τ	W_1	W_3	W_4	W_{24}	Effects of P_b	Effects of S_r	Inter-action
0.005	0.0061	0.0064	0.0053	0.0056	0.0003	-0.0008	-0.0000
0.020	0.0142	0.0157	0.0128	0.0142	0.0015	-0.0014	-0.0000
0.050	0.0277	0.0309	0.0252	0.0282	0.0031	-0.0026	-0.0001
0.110	0.0520	0.0579	0.0477	0.0530	0.0056	-0.0046	-0.0003
0.200	0.0864	0.0953	0.0794	0.0875	0.0085	-0.0074	-0.0004
0.380	0.1517	0.1654	0.1400	0.1523	0.0130	-0.0124	-0.0007
0.680	0.2596	0.2789	0.2400	0.2575	0.0184	-0.0205	-0.0009
0.980	0.3707	0.3924	0.3428	0.3623	0.0206	-0.0290	-0.0011
1.280	0.4830	0.5052	0.4467	0.4666	0.0210	-0.0374	-0.0012
1.580	0.5957	0.6175	0.5509	0.5705	0.0207	-0.0459	-0.0011
1.880	0.7089	0.7295	0.6554	0.6739	0.0195	-0.0546	-0.0011

TABLE 11.--Continued.

Parameter Varied	None	P_b	S_r'	P_b & S_r'			
τ	W_1	W_3	W_9	W_{25}	Effects of P_b	Effects of S_r'	Inter-action
0.005	0.0061	0.0064	0.0068	0.0071	0.0003	0.0007	0.0000
0.020	0.0142	0.0157	0.0155	0.0172	0.0016	0.0014	0.0001
0.050	0.0277	0.0309	0.0300	0.0334	0.0033	0.0024	0.0001
0.110	0.0520	0.0579	0.0559	0.0622	0.0061	0.0041	0.0002
0.200	0.0864	0.0953	0.0925	0.1020	0.0092	0.0064	0.0003
0.380	0.1517	0.1654	0.1618	0.1766	0.0143	0.0107	0.0006
0.680	0.2596	0.2789	0.2763	0.2971	0.0201	0.0175	0.0008
0.980	0.3707	0.3924	0.3942	0.4179	0.0227	0.0245	0.0010
1.280	0.4830	0.5052	0.5136	0.5379	0.0232	0.0316	0.0010
1.580	0.5957	0.6175	0.6335	0.6573	0.0228	0.0388	0.0010
1.880	0.7089	0.7295	0.7538	0.7764	0.0216	0.0459	0.0010

TABLE 11.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
τ	W_1	W_8	W_4	W_{26}	Effect of P_b'	Effect of S_r	Inter-action
0.005	0.0061	0.0057	0.0053	0.0050	-0.0004	-0.0007	0.0001
0.020	0.0142	0.0123	0.0128	0.0111	-0.0016	-0.0013	0.0001
0.050	0.0277	0.0242	0.0252	0.0220	-0.0034	-0.0024	0.0001
0.110	0.0520	0.0460	0.0477	0.0421	-0.0058	-0.0041	0.0002
0.200	0.0864	0.0775	0.0794	0.0713	-0.0085	-0.0066	0.0004
0.380	0.1517	0.1383	0.1400	0.1276	-0.0129	-0.0112	0.0005
0.680	0.2596	0.2410	0.2400	0.2230	-0.0176	-0.0188	0.0008
0.980	0.3707	0.3511	0.3428	0.3250	-0.0187	-0.0270	0.0009
1.280	0.4830	0.4645	0.4467	0.4299	-0.0177	-0.0355	0.0008
1.580	0.5957	0.5798	0.5509	0.5364	-0.0152	-0.0441	0.0007
1.880	0.7089	0.6961	0.6554	0.6437	-0.0122	-0.0529	0.0005

TABLE 11.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
τ	W_1	W_8	W_9	W_{27}	Effects of P_b'	Effects of S_r'	Interaction
0.005	0.0061	0.0057	0.0068	0.0064	-0.0004	0.0007	0.0000
0.020	0.0142	0.0123	0.0155	0.0134	-0.0020	0.0012	-0.0001
0.050	0.0277	0.0242	0.0300	0.0262	-0.0036	0.0021	-0.0001
0.110	0.0520	0.0460	0.0559	0.0495	-0.0062	0.0037	-0.0002
0.200	0.0864	0.0775	0.0925	0.0829	-0.0092	0.0058	-0.0004
0.380	0.1517	0.1383	0.1618	0.1474	-0.0139	0.0096	-0.0005
0.680	0.2596	0.2410	0.2763	0.2562	-0.0193	0.0160	-0.0008
0.980	0.3707	0.3511	0.3942	0.3729	-0.0205	0.0227	-0.0009
1.280	0.4830	0.4645	0.5136	0.4934	-0.0194	0.0297	-0.0009
1.580	0.5957	0.5798	0.6335	0.6160	-0.0167	0.0370	-0.0008
1.880	0.7089	0.6961	0.7538	0.7398	-0.0134	0.0443	-0.0006

TABLE 11.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
τ	W_1	W_3	W_5	W_{28}	Effects of P_b	Effects of η	Interaction
0.005	0.0061	0.0064	0.0087	0.0090	0.0003	0.0026	-0.0000
0.020	0.0142	0.0157	0.0175	0.0195	0.0018	0.0036	0.0003
0.050	0.0277	0.0309	0.0323	0.0360	0.0034	0.0049	0.0003
0.110	0.0520	0.0579	0.0581	0.0644	0.0061	0.0063	0.0002
0.200	0.0864	0.0953	0.0936	0.1034	0.0094	0.0077	0.0005
0.380	0.1517	0.1654	0.1605	0.1758	0.0145	0.0096	0.0008
0.680	0.2596	0.2789	0.2699	0.2918	0.0206	0.0116	0.0013
0.980	0.3707	0.3924	0.3818	0.4072	0.0236	0.0129	0.0018
1.280	0.4830	0.5052	0.4947	0.5215	0.0245	0.0140	0.0023
1.580	0.5957	0.6175	0.6081	0.6352	0.0244	0.0151	0.0026
1.880	0.7089	0.7295	0.7217	0.7483	0.0236	0.0158	0.0030

TABLE 11.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
τ	W_1	W_3	W_{10}	W_{29}	Effects of P_b	Effects of η'	Interaction
0.005	0.0061	0.0064	0.0032	0.0035	0.0003	-0.0029	0.0000
0.020	0.0142	0.0157	0.0097	0.0113	0.0016	-0.0044	0.0001
0.050	0.0277	0.0309	0.0220	0.0249	0.0030	-0.0059	-0.0001
0.110	0.0520	0.0579	0.0449	0.0498	0.0054	-0.0076	-0.0005
0.200	0.0864	0.0953	0.0779	0.0853	0.0081	-0.0092	-0.0007
0.380	0.1517	0.1654	0.1417	0.1528	0.0124	-0.0113	-0.0013
0.680	0.2596	0.2789	0.2486	0.2637	0.0172	-0.0131	-0.0021
0.980	0.3707	0.3924	0.3591	0.3754	0.0190	-0.0143	-0.0027
1.280	0.4830	0.5052	0.4708	0.4866	0.0190	-0.0154	-0.0032
1.580	0.5957	0.6175	0.5832	0.5978	0.0182	-0.0161	-0.0036
1.880	0.7089	0.7295	0.6959	0.7086	0.0166	-0.0169	-0.0040

TABLE 11.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
τ	W_1	W_3	W_6	W_{30}	Effects of P_b	Effects of K_v	Interaction
0.005	0.0061	0.0064	0.0061	0.0064	0.0003	0.0000	0.0000
0.020	0.0142	0.0157	0.0141	0.0156	0.0015	-0.0001	-0.0000
0.050	0.0277	0.0309	0.0275	0.0307	0.0032	-0.0002	0.0000
0.110	0.0520	0.0579	0.0514	0.0572	0.0059	-0.0006	-0.0001
0.200	0.0864	0.0953	0.0852	0.0938	0.0087	-0.0013	-0.0002
0.380	0.1517	0.1654	0.1491	0.1626	0.0136	-0.0027	-0.0001
0.680	0.2596	0.2789	0.2544	0.2730	0.0189	-0.0055	-0.0004
0.980	0.3707	0.3924	0.3626	0.3833	0.0212	-0.0086	-0.0005
1.280	0.4830	0.5052	0.4719	0.4929	0.0216	-0.0117	-0.0006
1.580	0.5957	0.6175	0.5816	0.6019	0.0211	-0.0149	-0.0007
1.880	0.7089	0.7295	0.6916	0.7106	0.0198	-0.0181	-0.0008

TABLE 11.--Continued.

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
τ	W_1	W_3	W_{11}	W_{31}	Effects of P_b	Effects of K_v'	Inter-action
0.005	0.0061	0.0064	0.0061	0.0064	0.0003	0.0000	0.0000
0.020	0.0142	0.0157	0.0142	0.0158	0.0015	0.0000	0.0000
0.050	0.0277	0.0309	0.0279	0.0312	0.0032	0.0002	0.0000
0.110	0.0520	0.0579	0.0526	0.0585	0.0059	0.0006	0.0000
0.200	0.0864	0.0953	0.0876	0.0966	0.0089	0.0013	0.0001
0.380	0.1517	0.1654	0.1543	0.1682	0.0138	0.0027	0.0001
0.680	0.2596	0.2789	0.2649	0.2846	0.0195	0.0055	0.0002
0.980	0.3707	0.3924	0.3788	0.4011	0.0220	0.0084	0.0003
1.280	0.4830	0.5052	0.4941	0.5171	0.0226	0.0115	0.0004
1.580	0.5957	0.6175	0.6099	0.6326	0.0223	0.0147	0.0004
1.860	0.7089	0.7295	0.7260	0.7478	0.0212	0.0177	0.0006

TABLE 11.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
τ	W_1	W_8	W_{11}	W_{32}	Effect of P_b'	Effect of K_v'	Inter-action
0.005	0.0061	0.0057	0.0061	0.0057	-0.0004	0.0000	0.0000
0.020	0.0142	0.0123	0.0142	0.0123	-0.0019	0.0000	0.0000
0.050	0.0277	0.0242	0.0279	0.0244	-0.0035	0.0002	0.0000
0.110	0.0520	0.0460	0.0526	0.0464	-0.0061	0.0005	-0.0001
0.200	0.0864	0.0775	0.0876	0.0785	-0.0090	0.0011	-0.0001
0.380	0.1517	0.1383	0.1543	0.1402	-0.0138	0.0022	-0.0004
0.680	0.2596	0.2410	0.2649	0.2504	-0.0165	0.0074	0.0021
0.980	0.3707	0.3511	0.3788	0.3778	-0.0103	0.0174	0.0093
1.280	0.4830	0.4645	0.4941	0.5046	-0.0040	0.0256	0.0145
1.580	0.5957	0.5798	0.6099	0.6301	0.0022	0.0323	0.0180
1.880	0.7089	0.6961	0.7260	0.7558	0.0085	0.0384	0.0213

TABLE 11.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
τ	W_1	W_4	W_5	W_{33}	Effects of S_r	Effects of η	Inter-action
0.005	0.0061	0.0053	0.0087	0.0077	-0.0009	0.0025	-0.0001
0.020	0.0142	0.0128	0.0175	0.0158	-0.0016	0.0031	-0.0001
0.050	0.0277	0.0252	0.0323	0.0293	-0.0028	0.0043	-0.0003
0.110	0.0520	0.0477	0.0581	0.0531	-0.0046	0.0058	-0.0004
0.200	0.0864	0.0794	0.0936	0.0559	-0.0224	-0.0082	-0.0154
0.380	0.1517	0.1400	0.1605	0.1479	-0.0122	0.0084	-0.0004
0.680	0.2596	0.2400	0.2699	0.2492	-0.0201	0.0098	-0.0005
0.980	0.3707	0.3428	0.3818	0.3527	-0.0285	0.0105	-0.0006
1.280	0.4830	0.4467	0.4947	0.4571	-0.0369	0.0110	-0.0006
1.580	0.5957	0.5509	0.6081	0.5618	-0.0456	0.0116	-0.0008
1.680	0.7089	0.6554	0.7217	0.6667	-0.0542	0.0121	-0.0007

TABLE 11.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
τ	W_1	W_4	W_{10}	W_{34}	Effects of S_r	Effects of η'	Inter-action
0.005	0.0061	0.0053	0.0032	0.0028	-0.0006	-0.0027	0.0002
0.020	0.0142	0.0128	0.0097	0.0088	-0.0011	-0.0042	0.0002
0.050	0.0277	0.0252	0.0220	0.0202	-0.0022	-0.0054	0.0003
0.110	0.0520	0.0477	0.0449	0.0413	-0.0039	-0.0067	0.0003
0.200	0.0864	0.0794	0.0779	0.0719	-0.0065	-0.0080	0.0005
0.380	0.1517	0.1400	0.1417	0.1310	-0.0112	-0.0095	0.0005
0.680	0.2596	0.2400	0.2486	0.2302	-0.0190	-0.0104	0.0006
0.980	0.3707	0.3428	0.3591	0.3325	-0.0272	-0.0109	0.0006
1.280	0.4830	0.4467	0.4708	0.4358	-0.0356	-0.0116	0.0006
1.580	0.5957	0.5509	0.5832	0.5397	-0.0442	-0.0119	0.0007
1.880	0.7089	0.6554	0.6959	0.6438	-0.0528	-0.0123	0.0007

TABLE 11.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
τ	W_1	W_9	W_5	W_{35}	Effects of S_r'	Effects of η	Inter-action
0.005	0.0061	0.0068	0.0087	0.0098	0.0009	0.0028	0.0002
0.020	0.0142	0.0155	0.0175	0.0191	0.0015	0.0034	0.0002
0.050	0.0277	0.0300	0.0323	0.0350	0.0025	0.0048	0.0002
0.110	0.0520	0.0559	0.0581	0.0626	0.0042	0.0064	0.0003
0.200	0.0864	0.0925	0.0936	0.1004	0.0065	0.0076	0.0003
0.380	0.1517	0.1618	0.1605	0.1716	0.0106	0.0093	0.0005
0.680	0.2596	0.2763	0.2699	0.2878	0.0173	0.0109	0.0006
0.980	0.3707	0.3942	0.3818	0.4066	0.0242	0.0117	0.0006
1.280	0.4830	0.5136	0.4947	0.5267	0.0313	0.0124	0.0007
1.580	0.5957	0.6335	0.6081	0.6472	0.0385	0.0130	0.0007
1.880	0.7089	0.7538	0.7217	0.7681	0.0457	0.0135	0.0007

TABLE 11.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
τ	W_1	W_4	W_6	W_{36}	Effects of S_r	Effects of K_v	Inter-action
0.005	0.0061	0.0053	0.0061	0.0053	-0.0008	0.0000	0.0000
0.020	0.0142	0.0128	0.0141	0.0127	-0.0014	-0.0001	-0.0000
0.050	0.0277	0.0252	0.0275	0.0250	-0.0025	-0.0002	0.0000
0.110	0.0520	0.0477	0.0514	0.0471	-0.0043	-0.0006	-0.0000
0.200	0.0864	0.0794	0.0852	0.0783	-0.0070	-0.0012	0.0000
0.380	0.1517	0.1400	0.1491	0.1375	-0.0117	-0.0025	0.0001
0.680	0.2596	0.2400	0.2544	0.2351	-0.0194	-0.0050	0.0001
0.980	0.3707	0.3428	0.3626	0.3351	-0.0277	-0.0079	0.0002
1.280	0.4830	0.4467	0.4719	0.4362	-0.0360	-0.0108	0.0003
1.580	0.5957	0.5509	0.5816	0.5376	-0.0444	-0.0137	0.0004
1.880	0.7089	0.6554	0.6916	0.6392	-0.0530	-0.0167	0.0006

TABLE 11.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
τ	W_1	W_9	W_5	W_{35}	Effects of S_r'	Effects of η	Inter-action
0.005	0.0061	0.0068	0.0087	0.0098	0.0009	0.0028	0.0002
0.020	0.0142	0.0155	0.0175	0.0191	0.0015	0.0034	0.0002
0.050	0.0277	0.0300	0.0323	0.0350	0.0025	0.0048	0.0002
0.110	0.0520	0.0559	0.0581	0.0626	0.0042	0.0064	0.0003
0.200	0.0864	0.0925	0.0936	0.1004	0.0065	0.0076	0.0003
0.380	0.1517	0.1618	0.1605	0.1716	0.0106	0.0093	0.0005
0.680	0.2596	0.2763	0.2699	0.2878	0.0173	0.0109	0.0006
0.980	0.3707	0.3942	0.3818	0.4066	0.0242	0.0117	0.0006
1.280	0.4830	0.5136	0.4947	0.5267	0.0313	0.0124	0.0007
1.580	0.5957	0.6335	0.6081	0.6472	0.0385	0.0130	0.0007
1.880	0.7089	0.7538	0.7217	0.7681	0.0457	0.0135	0.0007

TABLE 11.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
τ	W_1	W_4	W_6	W_{36}	Effects of S_r	Effects of K_v	Inter-action
0.005	0.0061	0.0053	0.0061	0.0053	-0.0008	0.0000	0.0000
0.020	0.0142	0.0128	0.0141	0.0127	-0.0014	-0.0001	-0.0000
0.050	0.0277	0.0252	0.0275	0.0250	-0.0025	-0.0002	0.0000
0.110	0.0520	0.0477	0.0514	0.0471	-0.0043	-0.0006	-0.0000
0.200	0.0864	0.0794	0.0852	0.0783	-0.0070	-0.0012	0.0000
0.380	0.1517	0.1400	0.1491	0.1375	-0.0117	-0.0025	0.0001
0.680	0.2596	0.2400	0.2544	0.2351	-0.0194	-0.0050	0.0001
0.980	0.3707	0.3428	0.3626	0.3351	-0.0277	-0.0079	0.0002
1.280	0.4830	0.4467	0.4719	0.4362	-0.0360	-0.0108	0.0003
1.580	0.5957	0.5509	0.5816	0.5376	-0.0444	-0.0137	0.0004
1.880	0.7089	0.6554	0.6916	0.6392	-0.0530	-0.0167	0.0006

TABLE 11.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
τ	W_1	W_4	W_{11}	W_{37}	Effect of S_r	Effect of K_v'	Inter-action
0,005	0,0061	0,0053	0,0061	0,0053	-0,0008	0,0000	0,0000
0,020	0,0142	0,0128	0,0142	0,0128	-0,0014	0,0000	-0,0000
0,050	0,0277	0,0252	0,0279	0,0254	-0,0025	0,0002	0,0000
0,110	0,0520	0,0477	0,0526	0,0482	-0,0043	0,0005	-0,0001
0,200	0,0864	0,0794	0,0876	0,0805	-0,0070	0,0012	-0,0000
0,380	0,1517	0,1400	0,1543	0,1425	-0,0118	0,0026	-0,0000
0,680	0,2596	0,2400	0,2649	0,2449	-0,0198	0,0051	-0,0002
0,980	0,3707	0,3428	0,3788	0,3504	-0,0282	0,0079	-0,0003
1,280	0,4830	0,4467	0,4941	0,4569	-0,0368	0,0106	-0,0005
1,580	0,5957	0,5509	0,6099	0,5640	-0,0453	0,0136	-0,0005
1,880	0,7089	0,6554	0,7260	0,6713	-0,0541	0,0165	-0,0006

TABLE 11.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
τ	W_1	W_9	W_6	W_{38}	Effect of S_r'	Effect of K_v	Inter-action
0,005	0,0061	0,0068	0,0061	0,0068	0,0007	0,0000	0,0000
0,020	0,0142	0,0155	0,0141	0,0154	0,0013	-0,0001	-0,0000
0,050	0,0277	0,0300	0,0275	0,0298	0,0023	-0,0002	0,0000
0,110	0,0520	0,0559	0,0514	0,0553	0,0039	-0,0006	-0,0000
0,200	0,0864	0,0925	0,0852	0,0913	0,0061	-0,0012	-0,0000
0,380	0,1517	0,1618	0,1491	0,1592	0,0101	-0,0026	0,0000
0,680	0,2596	0,2763	0,2544	0,2709	0,0166	-0,0053	-0,0001
0,980	0,3707	0,3942	0,3626	0,3858	0,0234	-0,0082	-0,0002
1,280	0,4830	0,5136	0,4719	0,5020	0,0303	-0,0113	-0,0003
1,580	0,5957	0,6335	0,5816	0,6187	0,0375	-0,0144	-0,0004
1,880	0,7089	0,7538	0,6916	0,7356	0,0445	-0,0178	-0,0004

TABLE 11.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
τ	W_1	W_9	W_{11}	W_{39}	Effect of S_r'	Effect of K_v'	Inter-action
0,005	0,0061	0,0068	0,0061	0,0068	0,0007	0,0000	0,0000
0,020	0,0142	0,0155	0,0142	0,0155	0,0013	0,0000	-0,0000
0,050	0,0277	0,0300	0,0279	0,0302	0,0023	0,0002	0,0000
0,110	0,0520	0,0559	0,0526	0,0565	0,0039	0,0006	-0,0000
0,200	0,0864	0,0925	0,0876	0,0937	0,0061	0,0012	0,0000
0,380	0,1517	0,1618	0,1543	0,1645	0,0102	0,0027	0,0001
0,680	0,2596	0,2763	0,2649	0,2817	0,0167	0,0054	0,0000
0,980	0,3707	0,3942	0,3788	0,4027	0,0237	0,0083	0,0002
1,280	0,4830	0,5136	0,4941	0,5252	0,0308	0,0113	0,0002
1,580	0,5957	0,6335	0,6099	0,6483	0,0381	0,0145	0,0003
1,880	0,7089	0,7538	0,7260	0,7718	0,0454	0,0176	0,0004

TABLE 11.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
τ	W_1	W_5	W_6	W_{40}	Effect of η	Effect of K_v	Inter-action
0,005	0,0061	0,0087	0,0061	0,0087	0,0026	0,0000	0,0000
0,020	0,0142	0,0175	0,0141	0,0174	0,0033	-0,0001	0,0000
0,050	0,0277	0,0323	0,0275	0,0321	0,0046	-0,0002	0,0000
0,110	0,0520	0,0581	0,0514	0,0575	0,0061	-0,0006	-0,0000
0,200	0,0864	0,0936	0,0852	0,0925	0,0073	-0,0011	0,0001
0,360	0,1517	0,1605	0,1491	0,1581	0,0089	-0,0025	0,0001
0,680	0,2596	0,2699	0,2544	0,2651	0,0105	-0,0050	0,0002
0,980	0,3707	0,3818	0,3626	0,3742	0,0113	-0,0078	0,0003
1,280	0,4830	0,4947	0,4719	0,4842	0,0120	-0,0108	0,0003
1,580	0,5957	0,6081	0,5816	0,5946	0,0127	-0,0138	0,0003
1,880	0,7089	0,7217	0,6916	0,7051	0,0132	-0,0170	0,0003

TABLE 11.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
τ	W_1	W_5	W_{11}	W_{41}	Effect of η	Effect of K_v'	Inter-action
0.005	0.0061	0.0087	0.0061	0.0087	0.0026	0.0000	0.0000
0.020	0.0142	0.0175	0.0142	0.0176	0.0033	0.0000	0.0000
0.050	0.0277	0.0323	0.0279	0.0325	0.0046	0.0002	0.0000
0.110	0.0520	0.0581	0.0526	0.0587	0.0061	0.0006	0.0000
0.200	0.0864	0.0936	0.0876	0.0947	0.0071	0.0012	-0.0001
0.380	0.1517	0.1605	0.1543	0.1630	0.0088	0.0026	-0.0000
0.680	0.2596	0.2699	0.2649	0.2748	0.0101	0.0051	-0.0002
0.980	0.3707	0.3818	0.3788	0.3895	0.0109	0.0079	-0.0002
1.280	0.4830	0.4947	0.4941	0.5053	0.0115	0.0109	-0.0002
1.580	0.5957	0.6081	0.6099	0.6215	0.0120	0.0138	-0.0004
1.880	0.7089	0.7217	0.7260	0.7380	0.0124	0.0167	-0.0004

TABLE 11.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
τ	W_1	W_{10}	W_6	W_{42}	Effect of η'	Effect of K_v	Inter-action
0.005	0.0061	0.0032	0.0061	0.0032	-0.0029	0.0000	0.0000
0.020	0.0142	0.0097	0.0141	0.0097	-0.0044	-0.0000	0.0001
0.050	0.0277	0.0220	0.0275	0.0218	-0.0057	-0.0002	0.0000
0.110	0.0520	0.0449	0.0514	0.0442	-0.0071	-0.0006	-0.0001
0.200	0.0864	0.0779	0.0852	0.0766	-0.0085	-0.0012	-0.0000
0.380	0.1517	0.1417	0.1491	0.1390	-0.0101	-0.0027	-0.0001
0.680	0.2596	0.2486	0.2544	0.2431	-0.0111	-0.0054	-0.0002
0.980	0.3707	0.3591	0.3626	0.3505	-0.0118	-0.0083	-0.0003
1.280	0.4830	0.4708	0.4719	0.4591	-0.0125	-0.0114	-0.0003
1.580	0.5957	0.5832	0.5816	0.5683	-0.0129	-0.0145	-0.0004
1.880	0.7089	0.6959	0.6916	0.6778	-0.0134	-0.0177	-0.0004

TABLE 12.--Vertical Penetration of Wetting Front, Main Effect, and Interactive Effect at Different Dimensionless Time Steps.

Parameter Varied	None	λ	P_b	λ & P_b			
τ	V_1	V_2	V_3	V_{12}	Effect of λ	Effect of P_b	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.4000	0.4000	0.4000	0.0500	0.0500	-0.0500
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.7000	0.0000	0.1000	-0.0000
0.200	0.8000	0.8000	0.9000	0.8000	-0.0500	0.0500	-0.0500
0.380	1.1000	0.9000	1.1000	1.0000	-0.1500	0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.3000	-0.0500	0.0500	0.0500
0.980	1.5000	1.3000	1.4000	1.5000	-0.0500	0.0500	0.1500
1.280	1.7000	1.5000	1.6000	1.6000	-0.1000	-0.0000	0.1000
1.580	1.8000	1.6000	1.7000	1.8000	-0.0500	0.0500	0.1500
1.880	2.0000	1.7000	1.8000	2.0000	-0.0500	0.0500	0.2500

TABLE 12.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
τ	V_1	V_7	V_3	V_{13}	Effect of λ'	Effect of P_b	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.7000	0.7000	0.8000	0.1000	0.1000	0.0000
0.200	0.8000	0.9000	0.9000	0.9000	0.0500	0.0500	-0.0500
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.6000	1.6000	1.5000	-0.1000	-0.1000	0.0000
1.580	1.8000	1.7000	1.7000	1.6000	-0.1000	-0.1000	-0.0000
1.880	2.0000	1.8000	1.8000	1.7000	-0.1500	-0.1500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	λ	S_r	λ & S_r			
τ	V_1	V_2	V_4	V_{15}	Effect of λ	Effect of S_r	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	0.9000	1.1000	1.0000	-0.1500	0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.2000	-0.1000	0.0000	0.0000
0.980	1.5000	1.3000	1.5000	1.3000	-0.2000	0.0000	0.0000
1.280	1.7000	1.5000	1.7000	1.5000	-0.2000	0.0000	0.0000
1.580	1.8000	1.6000	1.8000	1.6000	-0.2000	0.0000	0.0000
1.880	2.0000	1.7000	1.9000	1.7000	-0.2500	-0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	λ'	S_r	λ' & S_r			
τ	V_1	V_7	V_4	V_{17}	Effect of λ'	Effect of S_r	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.5000	1.5000	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.7000	1.6000	-0.1000	0.0000	0.0000
1.580	1.8000	1.7000	1.8000	1.7000	-0.1000	0.0000	0.0000
1.880	2.0000	1.8000	1.9000	1.8000	-0.1500	-0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	λ	S_r'	λ & S_r'			
τ	V_1	V_2	V_9	V_{16}	Effect of λ	Effect of S_r'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.7000	-0.0500	-0.0500	-0.0500
0.380	1.1000	0.9000	1.0000	0.9000	-0.1500	-0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.1000	-0.1500	-0.0500	-0.0500
0.980	1.5000	1.3000	1.5000	1.3000	-0.2000	0.0000	0.0000
1.280	1.7000	1.5000	1.7000	1.5000	-0.2000	0.0000	0.0000
1.580	1.8000	1.6000	1.9000	1.6000	-0.2500	0.0500	-0.0500
1.880	2.0000	1.7000	2.0000	1.8000	-0.2500	0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
τ	V_1	V_7	V_9	V_{18}	Effect of λ'	Effect of S_r'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.380	1.1000	1.1000	1.0000	1.1000	0.0500	-0.0500	0.0500
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.5000	1.5000	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.7000	1.6000	-0.1000	0.0000	0.0000
1.580	1.8000	1.7000	1.9000	1.7000	-0.1500	0.0500	-0.0500
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	λ'	η	λ' & η			
τ	V_1	V_7	V_5	V_{19}	Effect of λ'	Effect of η	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.4000	0.5000	0.1000	-0.1000	0.0000
0.110	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	-0.0000
0.200	0.8000	0.9000	0.7000	0.8000	0.1000	-0.1000	-0.0000
0.380	1.1000	1.1000	0.9000	1.0000	0.0500	-0.1500	0.0500
0.680	1.3000	1.3000	1.2000	1.3000	0.0500	-0.0500	0.0500
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.6000	1.6000	1.6000	-0.0500	-0.0500	0.0500
1.580	1.8000	1.7000	1.8000	1.7000	-0.1000	0.0000	0.0000
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	λ	K_v	λ & K_v			
τ	V_1	V_2	V_6	V_{20}	Effect of λ	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.6000	0.6000	-0.0000	0.0000	0.0000
0.200	0.8000	0.8000	0.8000	0.7000	-0.0500	-0.0500	-0.0500
0.380	1.1000	0.9000	1.0000	0.9000	-0.1500	-0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.1000	-0.1500	-0.0500	-0.0500
0.980	1.5000	1.3000	1.4000	1.3000	-0.1500	-0.0500	0.0500
1.280	1.7000	1.5000	1.6000	1.4000	-0.2000	-0.1000	0.0000
1.580	1.8000	1.6000	1.7000	1.5000	-0.2000	-0.1000	0.0000
1.880	2.0000	1.7000	1.9000	1.6000	-0.3000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
τ	V_1	V_2	V_{11}	V_{21}	Effect of λ	Effect of K_v'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	0.9000	1.1000	1.0000	-0.1500	0.0500	0.0500
0.660	1.3000	1.2000	1.3000	1.2000	-0.1000	0.0000	0.0000
0.980	1.5000	1.3000	1.6000	1.4000	-0.2000	0.1000	0.0000
1.280	1.7000	1.5000	1.7000	1.5000	-0.2000	0.0000	0.0000
1.580	1.8000	1.6000	1.9000	1.7000	-0.2000	0.1000	0.0000
1.860	2.0000	1.7000	2.0000	1.8000	-0.2500	0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
τ	V_1	V_7	V_6	V_{22}	Effect of λ'	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	-0.0000
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.380	1.1000	1.1000	1.0000	1.1000	0.0500	-0.0500	0.0500
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.6000	1.6000	1.5000	-0.1000	-0.1000	0.0000
1.580	1.8000	1.7000	1.7000	1.6000	-0.1000	-0.1000	-0.0000
1.880	2.0000	1.8000	1.9000	1.7000	-0.2000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
τ	V_1	V_7	V_{11}	V_{23}	Effect of λ'	Effect of K_v'	Interaction
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.7000	0.7000	0.8000	0.1000	0.1000	0.0000
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.360	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.4000	0.0500	0.0500	0.0500
0.980	1.5000	1.5000	1.6000	1.5000	-0.0500	0.0500	-0.0500
1.280	1.7000	1.6000	1.7000	1.7000	-0.0500	0.0500	0.0500
1.580	1.8000	1.7000	1.9000	1.8000	-0.1000	0.1000	-0.0000
1.880	2.0000	1.8000	2.0000	1.9000	-0.1500	0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
τ	V_1	V_3	V_4	V_{24}	Effect of P_b	Effect of S_r	Interaction
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.8000	0.0500	-0.0500	-0.0500
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.4000	1.5000	1.4000	-0.1000	0.0000	0.0000
1.280	1.7000	1.6000	1.7000	1.5000	-0.1500	-0.0500	-0.0500
1.580	1.8000	1.7000	1.8000	1.6000	-0.1500	-0.0500	-0.0500
1.880	2.0000	1.8000	1.9000	1.7000	-0.2000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b	S_r'	P_b & S_r'			
τ	V_1	V_3	V_9	V_{25}	Effect of P_b	Effect of S_r'	Interaction
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.8000	0.0500	-0.0500	-0.0500
0.380	1.1000	1.1000	1.0000	1.1000	0.0500	-0.0500	0.0500
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.960	1.5000	1.4000	1.5000	1.4000	-0.1000	0.0000	0.0000
1.280	1.7000	1.6000	1.7000	1.6000	-0.1000	0.0000	0.0000
1.580	1.8000	1.7000	1.9000	1.7000	-0.1500	0.0500	-0.0500
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
τ	V_1	V_8	V_4	V_{26}	Effect of P_b'	Effect of S_r	Interaction
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.4000	1.3000	1.4000	0.1000	0.0000	0.0000
0.980	1.5000	1.6000	1.5000	1.6000	0.1000	0.0000	0.0000
1.280	1.7000	1.9000	1.7000	1.8000	0.1500	-0.0500	-0.0500
1.580	1.8000	2.0000	1.8000	2.0000	0.2000	0.0000	0.0000
1.880	2.0000	2.0000	1.9000	2.0000	0.0500	-0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
τ	V_1	V_8	V_8	V_{27}	Effect of P_b'	Effect of S_r'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.1000	1.0000	1.1000	0.0500	-0.0500	0.0500
0.680	1.3000	1.4000	1.3000	1.4000	0.1000	0.0000	0.0000
0.980	1.5000	1.6000	1.5000	1.6000	0.1000	0.0000	0.0000
1.280	1.7000	1.9000	1.7000	1.9000	0.2000	0.0000	0.0000
1.580	1.8000	2.0000	1.9000	2.0000	0.1500	0.0500	-0.0500
1.880	2.0000	2.0000	2.0000	2.0000	0.0000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
τ	V_1	V_3	V_{10}	V_{29}	Effect of P_b	Effect of η'	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.4000	0.4000	0.4000	0.0500	0.0500	-0.0500
0.050	0.5000	0.5000	0.6000	0.6000	0.0000	0.1000	-0.0000
0.110	0.6000	0.7000	0.8000	0.6000	0.0500	0.1500	-0.0500
0.200	0.8000	0.9000	0.9000	0.9000	0.0500	0.0500	-0.0500
0.380	1.1000	1.1000	1.2000	1.1000	-0.0500	0.0500	-0.0500
0.680	1.3000	1.3000	1.4000	1.3000	-0.0500	0.0500	-0.0500
0.980	1.5000	1.4000	1.6000	1.5000	-0.1000	0.1000	0.0000
1.280	1.7000	1.6000	1.7000	1.6000	-0.1000	0.0000	0.0000
1.580	1.8000	1.7000	1.8000	1.7000	-0.1000	0.0000	0.0000
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
τ	V_1	V_3	V_5	V_{28}	Effect of P_b	Effect of η	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.3000	0.0500	-0.0500	-0.0500
0.050	0.5000	0.5000	0.4000	0.5000	0.0500	-0.0500	0.0500
0.110	0.6000	0.7000	0.6000	0.6000	0.0500	-0.0500	-0.0500
0.200	0.8000	0.9000	0.7000	0.8000	0.1000	-0.1000	-0.0000
0.380	1.1000	1.1000	0.9000	1.0000	0.0500	-0.1500	0.0500
0.680	1.3000	1.3000	1.2000	1.2000	0.0000	-0.1000	0.0000
0.980	1.5000	1.4000	1.4000	1.4000	-0.0500	-0.0500	0.0500
1.280	1.7000	1.6000	1.6000	1.5000	-0.1000	-0.1000	0.0000
1.580	1.8000	1.7000	1.8000	1.7000	-0.1000	0.0000	0.0000
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
τ	V_1	V_3	V_6	V_{30}	Effect of P_b	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	-0.0000
0.200	0.8000	0.9000	0.8000	0.8000	0.0500	-0.0500	-0.0500
0.380	1.1000	1.1000	1.0000	1.0000	0.0000	-0.1000	0.0000
0.680	1.3000	1.3000	1.3000	1.2000	-0.0500	-0.0500	-0.0500
0.980	1.5000	1.4000	1.4000	1.4000	-0.0500	-0.0500	0.0500
1.280	1.7000	1.6000	1.6000	1.5000	-0.1000	-0.1000	0.0000
1.580	1.8000	1.7000	1.7000	1.6000	-0.1000	-0.1000	-0.0000
1.880	2.0000	1.8000	1.9000	1.7000	-0.2000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
τ	V_1	V_3	V_{11}	V_{31}	Effect of P_b	Effect of K_v'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.4000	1.6000	1.5000	-0.1000	0.1000	0.0000
1.280	1.7000	1.6000	1.7000	1.6000	-0.1000	0.0000	0.0000
1.580	1.8000	1.7000	1.9000	1.7000	-0.1500	0.0500	-0.0500
1.880	2.0000	1.8000	2.0000	1.8000	-0.2000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
τ	V_1	V_4	V_5	V_{33}	Effect of S_r	Effect of η	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.4000	0.4000	0.0000	-0.1000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.0500	-0.0500	-0.0500
0.200	0.8000	0.8000	0.7000	0.7000	0.0000	-0.1000	-0.0000
0.380	1.1000	1.1000	0.9000	1.0000	0.0500	-0.1500	0.0500
0.680	1.3000	1.3000	1.2000	1.2000	0.0000	-0.1000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.7000	1.6000	1.6000	0.0000	-0.1000	0.0000
1.580	1.8000	1.8000	1.8000	1.6000	0.0000	0.0000	0.0000
1.880	2.0000	1.9000	2.0000	2.0000	-0.0500	0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
τ	V_1	V_8	V_{11}	V_{32}	Effect of P_b'	Effect of K_b'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.4000	1.3000	1.4000	0.1000	0.0000	0.0000
0.980	1.5000	1.6000	1.6000	2.0000	0.2500	0.2500	0.1500
1.280	1.7000	1.9000	1.7000	2.0000	0.2500	0.0500	0.0500
1.580	1.8000	2.0000	1.9000	2.0000	0.1500	0.0500	-0.0500
1.880	2.0000	2.0000	2.0000	2.0000	0.0000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
τ	V_1	V_4	V_{10}	V_{34}	Effect of S_r	Effect of η'	Inter-action
0.005	0.2000	0.2000	0.3000	0.3000	0.0000	0.1000	0.0000
0.020	0.3000	0.3000	0.4000	0.4000	0.0000	0.1000	0.0000
0.050	0.5000	0.5000	0.6000	0.6000	0.0000	0.1000	-0.0000
0.110	0.6000	0.7000	0.8000	0.8000	0.0500	0.1500	-0.0500
0.200	0.8000	0.8000	0.9000	1.0000	0.0500	0.1500	0.0500
0.380	1.1000	1.1000	1.2000	1.2000	0.0000	0.1000	0.0000
0.680	1.3000	1.3000	1.4000	1.4000	0.0000	0.1000	0.0000
0.980	1.5000	1.5000	1.6000	1.6000	0.0000	0.1000	0.0000
1.280	1.7000	1.7000	1.7000	1.7000	0.0000	0.0000	0.0000
1.580	1.8000	1.8000	1.8000	1.8000	0.0000	0.0000	0.0000
1.880	2.0000	1.9000	2.0000	1.9000	-0.1000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
τ	V_1	V_9	V_5	V_{35}	Effect of S_r'	Effect of η	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.4000	0.4000	0.0000	-0.1000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.0500	-0.0500	-0.0500
0.200	0.8000	0.8000	0.7000	0.7000	0.0000	-0.1000	-0.0000
0.380	1.1000	1.0000	0.9000	1.0000	0.0000	-0.1000	0.1000
0.680	1.3000	1.3000	1.2000	1.2000	0.0000	-0.1000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.7000	1.6000	1.7000	0.0500	-0.0500	0.0500
1.580	1.8000	1.9000	1.8000	1.9000	0.1000	0.0000	0.0000
1.880	2.0000	2.0000	2.0000	2.0000	0.0000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
τ	V_1	V_4	V_{11}	V_{37}	Effect of S_r	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.4000	0.0500	0.0500	0.0500
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.7000	0.0500	0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.6000	1.5000	-0.0500	0.0500	-0.0500
1.280	1.7000	1.7000	1.7000	1.7000	0.0000	0.0000	0.0000
1.580	1.8000	1.8000	1.9000	1.9000	0.0000	0.1000	0.0000
1.880	2.0000	1.9000	2.0000	2.0000	-0.0500	0.0500	0.0500

TABLE 12.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
τ	V_1	V_4	V_6	V_{35}	Effect of S_r	Effect of K_v	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.0500	-0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.1000	1.0000	1.0000	0.0000	-0.1000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.7000	1.6000	1.6000	0.0000	-0.1000	0.0000
1.580	1.8000	1.8000	1.7000	1.7000	0.0000	-0.1000	0.0000
1.880	2.0000	1.9000	1.9000	1.8000	-0.1000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
τ	V_1	V_9	V_6	V_{38}	Effect of S_r'	Effect of K_v	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.0500	-0.0500	-0.0500
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.0000	1.0000	1.0000	-0.0500	-0.0500	0.0500
0.680	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	0.0000	-0.1000	0.0000
1.280	1.7000	1.7000	1.6000	1.6000	0.0000	-0.1000	0.0000
1.580	1.8000	1.9000	1.7000	1.8000	0.1000	-0.1000	-0.0000
1.880	2.0000	2.0000	1.9000	1.9000	0.0000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
τ	V_1	V_9	V_{11}	V_{39}	Effect of S_r'	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.6000	0.0000	0.0000	-0.1000
0.200	0.8000	0.8000	0.8000	0.8000	0.0000	0.0000	-0.0000
0.380	1.1000	1.0000	1.1000	1.1000	-0.0500	0.0500	0.0500
0.680	1.3000	1.3000	1.3000	1.4000	0.0500	0.0500	0.0500
0.980	1.5000	1.5000	1.6000	1.6000	0.0000	0.1000	0.0000
1.280	1.7000	1.7000	1.7000	1.8000	0.0500	0.0500	0.0500
1.580	1.8000	1.9000	1.9000	2.0000	0.1000	0.1000	0.0000
1.880	2.0000	2.0000	2.0000	2.0000	0.0000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
τ	V_1	V_5	V_6	V_{40}	Effect of η	Effect of K_v	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.110	0.6000	0.6000	0.6000	0.6000	-0.0000	0.0000	0.0000
0.200	0.8000	0.7000	0.8000	0.7000	-0.1000	0.0000	-0.0000
0.380	1.1000	0.9000	1.0000	0.9000	-0.1500	-0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.2000	-0.1000	0.0000	0.0000
0.980	1.5000	1.4000	1.4000	1.4000	-0.0500	-0.0500	0.0500
1.280	1.7000	1.6000	1.6000	1.6000	-0.0500	-0.0500	0.0500
1.580	1.8000	1.8000	1.7000	1.7000	0.0000	-0.1000	0.0000
1.880	2.0000	2.0000	1.9000	1.9000	0.0000	-0.1000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
τ	V_1	V_5	V_{11}	V_{41}	Effect of η	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.6000	-0.0500	0.0500	-0.0500
0.200	0.8000	0.7000	0.8000	0.8000	-0.0500	0.0500	0.0500
0.380	1.1000	0.9000	1.1000	1.0000	-0.1500	0.0500	0.0500
0.680	1.3000	1.2000	1.3000	1.3000	-0.0500	0.0500	0.0500
0.980	1.5000	1.4000	1.6000	1.5000	-0.1000	0.1000	0.0000
1.280	1.7000	1.6000	1.7000	1.7000	-0.0500	0.0500	0.0500
1.580	1.8000	1.8000	1.9000	2.0000	0.0500	0.1500	0.0500
1.880	2.0000	2.0000	2.0000	2.0000	0.0000	0.0000	0.0000

TABLE 12.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
τ	V_1	V_{10}	V_6	V_{42}	Effect of η'	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.110	0.6000	0.8000	0.6000	0.7000	0.1500	-0.0500	-0.0500
0.200	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.380	1.1000	1.2000	1.0000	1.1000	0.1000	-0.1000	-0.0000
0.680	1.3000	1.4000	1.3000	1.3000	0.0500	-0.0500	-0.0500
0.980	1.5000	1.6000	1.4000	1.5000	0.1000	-0.1000	0.0000
1.280	1.7000	1.7000	1.6000	1.6000	0.0000	-0.1000	0.0000
1.580	1.8000	1.8000	1.7000	1.8000	0.0500	-0.0500	0.0500
1.880	2.0000	2.0000	1.9000	1.9000	0.0000	-0.1000	0.0000

TABLE 13.--Horizontal Movement of Wetting Front, Main Effect, and Interactive Effect at Different Dimensionless Time Steps.

Parameter Varied	None	λ	P_b	λ & P_b			
τ	H_1	H_2	H_3	H_{12}	Effect of λ	Effect of P_b	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.3000	0.4000	0.4000	0.0000	0.1000	0.0000
0.050	0.4000	0.4000	0.5000	0.4000	-0.0500	0.0500	-0.0500
0.110	0.5000	0.4000	0.6000	0.5000	-0.1000	0.1000	0.0000
0.200	0.6000	0.5000	0.7000	0.6000	-0.1000	0.1000	-0.0000
0.380	0.8000	0.6000	0.9000	0.8000	-0.1500	0.1500	0.0500
0.680	1.0000	0.6000	1.2000	0.9000	-0.3500	0.2500	0.0500
0.980	1.1000	0.7000	1.4000	1.1000	-0.3500	0.3500	0.0500
1.280	1.2000	0.8000	1.5000	1.2000	-0.3500	0.3500	0.0500
1.580	1.3000	0.9000	1.6000	1.3000	-0.3500	0.3500	0.0500
1.880	1.4000	0.9000	1.7000	1.4000	-0.4000	0.4000	0.1000

TABLE 13.--Continued.

Parameter Varied	None	λ	S_r	λ & S_r			
τ	H_1	H_2	H_4	H_{15}	Effect of λ	Effect of S_r	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.6000	-0.2000	0.0000	0.0000
0.680	1.0000	0.6000	1.0000	0.7000	-0.3500	0.0500	0.0500
0.980	1.1000	0.7000	1.1000	0.7000	-0.4000	0.0000	-0.0000
1.280	1.2000	0.8000	1.2000	0.8000	-0.4000	0.0000	-0.0000
1.580	1.3000	0.9000	1.3000	0.9000	-0.4000	0.0000	-0.0000
1.880	1.4000	0.9000	1.4000	0.9000	-0.5000	0.0000	-0.0000

TABLE 13.--Continued.

Parameter Varied	None	λ'	P_b	λ' & P_b			
τ	H_1	H_7	H_3	H_{13}	Effect of λ'	Effect of P_b	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	0.0000
0.050	0.4000	0.5000	0.5000	0.6000	0.1000	0.1000	0.0000
0.110	0.5000	0.7000	0.6000	0.8000	0.2000	0.1000	-0.0000
0.200	0.6000	0.8000	0.7000	1.0000	0.2500	0.1500	0.0500
0.380	0.8000	1.0000	0.9000	1.3000	0.3000	0.2000	0.1000
0.680	1.0000	1.3000	1.2000	1.6000	0.3500	0.2500	0.0500
0.980	1.1000	1.5000	1.4000	1.8000	0.4000	0.3000	0.0000
1.280	1.2000	1.6000	1.5000	2.0000	0.4500	0.3500	0.0500
1.580	1.3000	1.8000	1.6000	2.2000	0.5500	0.3500	0.0500
1.880	1.4000	1.9000	1.7000	2.3000	0.5500	0.3500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	λ	S_r'	λ & S_r'			
τ	H_1	H_2	H_9	H_{16}	Effect of λ	Effect of S_r'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.5000	-0.2500	-0.0500	-0.0500
0.680	1.0000	0.6000	0.9000	0.6000	-0.3500	-0.0500	0.0500
0.980	1.1000	0.7000	1.1000	0.7000	-0.4000	0.0000	-0.0000
1.280	1.2000	0.8000	1.2000	0.8000	-0.4000	0.0000	-0.0000
1.580	1.3000	0.9000	1.3000	0.8000	-0.4500	-0.0500	-0.0500
1.880	1.4000	0.9000	1.3000	0.9000	-0.4500	-0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	λ'	S_r	λ' & S_r			
τ	H_1	H_7	H_4	H_{17}	Effect of λ'	Effect of S_r	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.7000	0.2000	0.0000	-0.0000
0.200	0.6000	0.8000	0.6000	0.8000	0.2000	0.0000	0.0000
0.380	0.8000	1.0000	0.8000	1.1000	0.2500	0.0500	0.0500
0.680	1.0000	1.3000	1.0000	1.3000	0.3000	0.0000	0.0000
0.980	1.1000	1.5000	1.1000	1.5000	0.4000	0.0000	0.0000
1.280	1.2000	1.6000	1.2000	1.7000	0.4500	0.0500	0.0500
1.580	1.3000	1.8000	1.3000	1.8000	0.5000	0.0000	0.0000
1.880	1.4000	1.9000	1.4000	2.0000	0.5500	0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	λ'	S_r'	λ' & S_r'			
τ	H_1	H_7	H_9	H_{18}	Effect of λ'	Effect of S_r'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.6000	0.1500	-0.0500	-0.0500
0.200	0.6000	0.8000	0.6000	0.8000	0.2000	0.0000	0.0000
0.380	0.8000	1.0000	0.8000	1.0000	0.2000	0.0000	0.0000
0.680	1.0000	1.3000	0.9000	1.3000	0.3500	-0.0500	0.0500
0.980	1.1000	1.5000	1.1000	1.4000	0.3500	-0.0500	-0.0500
1.280	1.2000	1.6000	1.2000	1.6000	0.4000	0.0000	0.0000
1.580	1.3000	1.8000	1.3000	1.7000	0.4500	-0.0500	-0.0500
1.880	1.4000	1.9000	1.3000	1.8000	0.5000	-0.1000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	λ'	η	λ' & η			
τ	H_1	H_7	H_6	H_{18}	Effect of λ'	Effect of η	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.6000	0.1500	-0.0500	-0.0500
0.200	0.6000	0.8000	0.5000	0.7000	0.2000	-0.1000	0.0000
0.380	0.8000	1.0000	0.7000	0.9000	0.2000	-0.1000	0.0000
0.680	1.0000	1.3000	0.8000	1.1000	0.3000	-0.2000	0.0000
0.980	1.1000	1.5000	0.9000	1.3000	0.4000	-0.2000	0.0000
1.280	1.2000	1.6000	1.0000	1.4000	0.4000	-0.2000	0.0000
1.580	1.3000	1.8000	1.1000	1.5000	0.4500	-0.2500	-0.0500
1.880	1.4000	1.9000	1.2000	1.6000	0.4500	-0.2500	-0.0500

TABLE 13.--Continued.

Parameter Varied	None	λ	K_v	λ & K_v			
τ	H_1	H_2	H_6	H_{20}	Effect of λ	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.6000	-0.2000	0.0000	0.0000
0.680	1.0000	0.6000	0.9000	0.6000	-0.3500	-0.0500	0.0500
0.980	1.1000	0.7000	1.1000	0.7000	-0.4000	0.0000	-0.0000
1.280	1.2000	0.8000	1.2000	0.8000	-0.4000	0.0000	-0.0000
1.580	1.3000	0.9000	1.3000	0.9000	-0.4000	0.0000	-0.0000
1.880	1.4000	0.9000	1.4000	0.9000	-0.5000	0.0000	-0.0000

TABLE 13.--Continued.

Parameter Varied	None	λ'	K_v	λ' & K_v			
τ	H_1	H_7	H_6	H_{22}	Effect of λ'	Effect of k_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.7000	0.2000	0.0000	-0.0000
0.200	0.6000	0.8000	0.6000	0.8000	0.2000	0.0000	0.0000
0.380	0.8000	1.0000	0.8000	1.0000	0.2000	0.0000	0.0000
0.680	1.0000	1.3000	0.9000	1.3000	0.3500	-0.0500	0.0500
0.980	1.1000	1.5000	1.1000	1.5000	0.4000	0.0000	0.0000
1.280	1.2000	1.6000	1.2000	1.6000	0.4000	0.0000	0.0000
1.580	1.3000	1.8000	1.3000	1.8000	0.5000	0.0000	0.0000
1.880	1.4000	1.9000	1.4000	1.9000	0.5000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	λ	K_v'	λ & K_v'			
τ	H_1	H_2	H_{11}	H_{21}	Effect of λ	Effect of K_v'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.6000	-0.2000	0.0000	0.0000
0.680	1.0000	0.6000	1.0000	0.6000	-0.4000	0.0000	0.0000
0.980	1.1000	0.7000	1.1000	0.7000	-0.4000	0.0000	-0.0000
1.280	1.2000	0.8000	1.2000	0.8000	-0.4000	0.0000	-0.0000
1.580	1.3000	0.9000	1.3000	0.9000	-0.4000	0.0000	-0.0000
1.880	1.4000	0.9000	1.4000	0.9000	-0.5000	0.0000	-0.0000

TABLE 13.--Continued.

Parameter Varied	None	λ'	K_v'	λ' & K_v'			
τ	H_1	H_7	H_{11}	H_{23}	Effect of λ '	Effect of K_v'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.7000	0.2000	0.0000	-0.0000
0.200	0.6000	0.8000	0.6000	0.8000	0.2000	0.0000	0.0000
0.380	0.8000	1.0000	0.8000	1.0000	0.2000	0.0000	0.0000
0.680	1.0000	1.3000	1.0000	1.3000	0.3000	0.0000	0.0000
0.980	1.1000	1.5000	1.1000	1.5000	0.4000	0.0000	0.0000
1.280	1.2000	1.6000	1.2000	1.6000	0.4000	0.0000	0.0000
1.580	1.3000	1.8000	1.3000	1.8000	0.5000	0.0000	0.0000
1.880	1.4000	1.9000	1.4000	1.9000	0.5000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	P_b	S_r	P_b & S_r			
τ	H_1	H_3	H_4	H_{24}	Effect of P_b	Effect of S_r	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.200	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	0.0000
0.380	0.8000	0.9000	0.8000	1.0000	0.1500	0.0500	0.0500
0.680	1.0000	1.2000	1.0000	1.2000	0.2000	0.0000	0.0000
0.980	1.1000	1.4000	1.1000	1.4000	0.3000	0.0000	0.0000
1.280	1.2000	1.5000	1.2000	1.5000	0.3000	0.0000	0.0000
1.580	1.3000	1.6000	1.3000	1.6000	0.3000	0.0000	0.0000
1.880	1.4000	1.7000	1.4000	1.8000	0.3500	0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	P_b	S_r'	P_b & S_r'			
τ	H_1	H_3	H_9	H_{25}	Effect of P_b	Effect of S_r'	Interaction
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.200	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	0.0000
0.380	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.680	1.0000	1.2000	0.9000	1.1000	0.2000	-0.1000	-0.0000
0.980	1.1000	1.4000	1.1000	1.3000	0.2500	-0.0500	-0.0500
1.280	1.2000	1.5000	1.2000	1.4000	0.2500	-0.0500	-0.0500
1.580	1.3000	1.6000	1.3000	1.6000	0.3000	0.0000	0.0000
1.880	1.4000	1.7000	1.3000	1.7000	0.3500	-0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	P_b'	S_r'	P_b' & S_r'			
τ	H_1	H_8	H_9	H_{27}	Effect of P_b'	Effect of S_r'	Interaction
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.3000	-0.0500	-0.0500	-0.0500
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.6000	-0.2000	0.0000	0.0000
0.680	1.0000	0.8000	0.9000	0.8000	-0.1500	-0.0500	0.0500
0.980	1.1000	0.9000	1.1000	0.9000	-0.2000	0.0000	-0.0000
1.280	1.2000	0.9000	1.2000	1.0000	-0.2500	0.0500	0.0500
1.580	1.3000	1.0000	1.3000	1.1000	-0.2500	0.0500	0.0500
1.880	1.4000	1.1000	1.3000	1.2000	-0.2000	0.0000	0.1000

TABLE 13.--Continued.

Parameter Varied	None	P_b'	S_r	P_b' & S_r			
τ	H_1	H_8	H_4	H_{26}	Effect of P_b'	Effect of S_r	Interaction
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.7000	-0.1500	0.0500	0.0500
0.680	1.0000	0.8000	1.0000	0.8000	-0.2000	0.0000	0.0000
0.980	1.1000	0.9000	1.1000	0.9000	-0.2000	0.0000	-0.0000
1.280	1.2000	0.9000	1.2000	1.0000	-0.2500	0.0500	0.0500
1.580	1.3000	1.0000	1.3000	1.1000	-0.2500	0.0500	0.0500
1.880	1.4000	1.1000	1.4000	1.2000	-0.2500	0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	P_b	η	P_b & η			
τ	H_1	H_3	H_5	H_{28}	Effect of P_b	Effect of η	Interaction
0.005	0.2000	0.3000	0.2000	0.2000	0.0500	-0.0500	-0.0500
0.020	0.3000	0.4000	0.3000	0.3000	0.0500	-0.0500	-0.0500
0.050	0.4000	0.5000	0.4000	0.4000	0.0500	-0.0500	-0.0500
0.110	0.5000	0.6000	0.5000	0.5000	0.0500	-0.0500	-0.0500
0.200	0.6000	0.7000	0.5000	0.5000	0.0500	-0.1500	-0.0500
0.380	0.8000	0.9000	0.7000	0.8000	0.1000	-0.1000	-0.0000
0.680	1.0000	1.2000	0.8000	1.0000	0.2000	-0.2000	-0.0000
0.980	1.1000	1.4000	0.9000	1.1000	0.2500	-0.2500	-0.0500
1.280	1.2000	1.5000	1.0000	1.3000	0.3000	-0.2000	0.0000
1.580	1.3000	1.6000	1.1000	1.4000	0.3000	-0.2000	0.0000
1.880	1.4000	1.7000	1.2000	1.5000	0.3000	-0.2000	-0.0000

TABLE 13.--Continued.

Parameter Varied	None	P_b	η'	P_b & η'			
τ	H_1	H_3	H_{10}	H_{29}	Effect of P_b	Effect of η'	Inter-action
0.005	0.2000	0.3000	0.3000	0.3000	0.0500	0.0500	-0.0500
0.020	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	0.0000
0.050	0.4000	0.5000	0.5000	0.6000	0.1000	0.1000	0.0000
0.110	0.5000	0.6000	0.7000	0.8000	0.1000	0.2000	-0.0000
0.200	0.6000	0.7000	0.8000	1.0000	0.1500	0.2500	0.0500
0.380	0.8000	0.9000	1.0000	1.2000	0.1500	0.2500	0.0500
0.680	1.0000	1.2000	1.2000	1.5000	0.2500	0.2500	0.0500
0.980	1.1000	1.4000	1.4000	1.7000	0.3000	0.3000	0.0000
1.280	1.2000	1.5000	1.5000	1.9000	0.3500	0.3500	0.0500
1.580	1.3000	1.6000	1.6000	2.1000	0.4000	0.4000	0.1000
1.880	1.4000	1.7000	1.8000	2.2000	0.3500	0.4500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	P_b	K_v	P_b & K_v			
τ	H_1	H_3	H_6	H_{30}	Effect of P_b	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.200	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	0.0000
0.380	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.680	1.0000	1.2000	0.9000	1.2000	0.2500	-0.0500	0.0500
0.980	1.1000	1.4000	1.1000	1.3000	0.2500	-0.0500	-0.0500
1.280	1.2000	1.5000	1.2000	1.5000	0.3000	0.0000	0.0000
1.580	1.3000	1.6000	1.3000	1.6000	0.3000	0.0000	0.0000
1.880	1.4000	1.7000	1.4000	1.7000	0.3000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	P_b	K_v'	P_b & K_v'			
τ	H_1	H_3	H_{11}	H_{31}	Effect of P_b	Effect of K_v'	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.6000	0.5000	0.6000	0.1000	0.0000	-0.0000
0.200	0.6000	0.7000	0.6000	0.7000	0.1000	0.0000	0.0000
0.380	0.8000	0.9000	0.8000	0.9000	0.1000	0.0000	0.0000
0.680	1.0000	1.2000	1.0000	1.2000	0.2000	0.0000	0.0000
0.980	1.1000	1.4000	1.1000	1.3000	0.2500	-0.0500	-0.0500
1.280	1.2000	1.5000	1.2000	1.5000	0.3000	0.0000	0.0000
1.580	1.3000	1.6000	1.3000	1.6000	0.3000	0.0000	0.0000
1.880	1.4000	1.7000	1.4000	1.7000	0.3000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	P_b'	K_v'	P_b' & K_v'			
τ	H_1	H_8	H_{11}	H_{32}	Effect of P_b'	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.5000	0.4000	-0.1000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.6000	0.8000	0.6000	-0.2000	0.0000	0.0000
0.680	1.0000	0.8000	1.0000	0.8000	-0.2000	0.0000	0.0000
0.980	1.1000	0.9000	1.1000	0.9000	-0.2000	0.0000	-0.0000
1.280	1.2000	0.9000	1.2000	1.0000	-0.2500	0.0500	0.0500
1.580	1.3000	1.0000	1.3000	1.1000	-0.2500	0.0500	0.0500
1.880	1.4000	1.1000	1.4000	1.2000	-0.2500	0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	S_r	η	S_r & η			
τ	H_1	H_4	H_5	H_{33}	Effect of S_r	Effect of η	Inter-action
0,005	0,2000	0,2000	0,2000	0,2000	0,0000	0,0000	0,0000
0,020	0,3000	0,3000	0,3000	0,3000	0,0000	0,0000	0,0000
0,050	0,4000	0,4000	0,4000	0,4000	0,0000	0,0000	0,0000
0,110	0,5000	0,5000	0,5000	0,5000	0,0000	0,0000	0,0000
0,200	0,6000	0,6000	0,5000	0,6000	0,0500	-0,0500	0,0500
0,380	0,8000	0,8000	0,7000	0,7000	-0,0000	-0,1000	0,0000
0,680	1,0000	1,0000	0,8000	0,8000	-0,0000	-0,2000	0,0000
0,980	1,1000	1,1000	0,9000	1,0000	0,0500	-0,1500	0,0500
1,280	1,2000	1,2000	1,0000	1,1000	0,0500	-0,1500	0,0500
1,580	1,3000	1,3000	1,1000	1,2000	0,0500	-0,1500	0,0500
1,880	1,4000	1,4000	1,2000	1,2000	0,0000	-0,2000	0,0000

TABLE 13.--Continued.

Parameter Varied	None	S_r	η'	S_r & η'			
τ	H_1	H_4	H_{10}	H_{34}	Effect of S_r	Effect of η	Inter-action
0,005	0,2000	0,2000	0,3000	0,3000	0,0000	0,1000	0,0000
0,020	0,3000	0,3000	0,4000	0,4000	0,0000	0,1000	0,0000
0,050	0,4000	0,4000	0,5000	0,5000	0,0000	0,1000	0,0000
0,110	0,5000	0,5000	0,7000	0,7000	0,0000	0,2000	-0,0000
0,200	0,6000	0,6000	0,8000	0,9000	0,0500	0,2500	0,0500
0,380	0,8000	0,8000	1,0000	1,0000	-0,0000	0,2000	0,0000
0,680	1,0000	1,0000	1,2000	1,3000	0,0500	0,2500	0,0500
0,980	1,1000	1,1000	1,4000	1,4000	0,0000	0,3000	0,0000
1,280	1,2000	1,2000	1,5000	1,6000	0,0500	0,3500	0,0500
1,580	1,3000	1,3000	1,6000	1,7000	0,0500	0,3500	0,0500
1,880	1,4000	1,4000	1,8000	1,8000	0,0000	0,4000	0,0000

TABLE 13.--Continued.

Parameter Varied	None	S_r'	η	S_r' & η			
τ	H_1	H_9	H_5	H_{35}	Effect of S_r'	Effect of η	Inter-action
0,005	0,2000	0,2000	0,2000	0,2000	0,0000	0,0000	0,0000
0,020	0,3000	0,3000	0,3000	0,3000	0,0000	0,0000	0,0000
0,050	0,4000	0,4000	0,4000	0,4000	0,0000	0,0000	0,0000
0,110	0,5000	0,5000	0,5000	0,5000	0,0000	0,0000	0,0000
0,200	0,6000	0,6000	0,5000	0,5000	0,0000	-0,1000	-0,0000
0,380	0,8000	0,8000	0,7000	0,7000	-0,0000	-0,1000	0,0000
0,680	1,0000	0,9000	0,8000	0,8000	-0,0500	-0,1500	0,0500
0,960	1,1000	1,1000	0,9000	0,9000	0,0000	-0,2000	-0,0000
1,280	1,2000	1,2000	1,0000	1,0000	0,0000	-0,2000	-0,0000
1,580	1,3000	1,3000	1,1000	1,1000	0,0000	-0,2000	0,0000
1,880	1,4000	1,3000	1,2000	1,2000	-0,0500	-0,1500	0,0500

TABLE 13.--Continued.

Parameter Varied	None	S_r	K_v	S_r & K_v			
τ	H_1	H_4	H_6	H_{36}	Effect of S_r	Effect of K_v	Inter-action
0,005	0,2000	0,2000	0,2000	0,2000	0,0000	0,0000	0,0000
0,020	0,3000	0,3000	0,3000	0,3000	0,0000	0,0000	0,0000
0,050	0,4000	0,4000	0,4000	0,4000	0,0000	0,0000	0,0000
0,110	0,5000	0,5000	0,5000	0,5000	0,0000	0,0000	0,0000
0,200	0,6000	0,6000	0,6000	0,6000	-0,0000	0,0000	0,0000
0,380	0,8000	0,8000	0,8000	0,8000	-0,0000	0,0000	0,0000
0,680	1,0000	1,0000	0,9000	1,0000	0,0500	-0,0500	0,0500
0,980	1,1000	1,1000	1,1000	1,1000	0,0000	0,0000	0,0000
1,280	1,2000	1,2000	1,2000	1,2000	0,0000	0,0000	0,0000
1,560	1,3000	1,3000	1,3000	1,3000	0,0000	0,0000	0,0000
1,860	1,4000	1,4000	1,4000	1,4000	0,0000	0,0000	0,0000

TABLE 13.--Continued.

Parameter Varied	None	S_r	K_v'	S_r & K_v'			
τ	H_1	H_4	H_{11}	H_{37}	Effect of S_r	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.200	0.6000	0.6000	0.6000	0.6000	-0.0000	0.0000	0.0000
0.380	0.8000	0.8000	0.8000	0.8000	-0.0000	0.0000	0.0000
0.680	1.0000	1.0000	1.0000	1.0000	-0.0000	0.0000	0.0000
0.980	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
1.280	1.2000	1.2000	1.2000	1.2000	0.0000	0.0000	0.0000
1.560	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
1.880	1.4000	1.4000	1.4000	1.4000	0.0000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	S_r'	K_v'	S_r' & K_v'			
τ	H_1	H_9	H_{11}	H_{39}	Effect of S_r'	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.200	0.6000	0.6000	0.6000	0.6000	-0.0000	0.0000	0.0000
0.380	0.8000	0.8000	0.8000	0.8000	-0.0000	0.0000	0.0000
0.660	1.0000	0.9000	1.0000	0.9000	-0.1000	0.0000	0.0000
0.980	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
1.280	1.2000	1.2000	1.2000	1.2000	0.0000	0.0000	0.0000
1.580	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
1.860	1.4000	1.3000	1.4000	1.4000	-0.0500	0.0500	0.0500

TABLE 13.--Continued.

Parameter Varied	None	S_r'	K_v	S_r' & K_v			
τ	H_1	H_9	H_6	H_{38}	Effect of S_r'	Effect of K_v	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.200	0.6000	0.6000	0.6000	0.6000	-0.0000	0.0000	0.0000
0.380	0.8000	0.8000	0.8000	0.8000	-0.0000	0.0000	0.0000
0.680	1.0000	0.9000	0.9000	0.9000	-0.0500	-0.0500	0.0500
0.980	1.1000	1.1000	1.1000	1.1000	0.0000	0.0000	0.0000
1.280	1.2000	1.2000	1.2000	1.2000	0.0000	0.0000	0.0000
1.580	1.3000	1.3000	1.3000	1.3000	0.0000	0.0000	0.0000
1.880	1.4000	1.3000	1.4000	1.3000	-0.1000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	η	K_v	η & K_v			
τ	H_1	H_5	H_6	H_{40}	Effect of η	Effect of K_v	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.7000	0.8000	0.7000	-0.1000	0.0000	0.0000
0.680	1.0000	0.8000	0.9000	0.8000	-0.1500	-0.0500	0.0500
0.980	1.1000	0.9000	1.1000	0.9000	-0.2000	0.0000	-0.0000
1.280	1.2000	1.0000	1.2000	1.0000	-0.2000	0.0000	-0.0000
1.580	1.3000	1.1000	1.3000	1.1000	-0.2000	0.0000	0.0000
1.880	1.4000	1.2000	1.4000	1.2000	-0.2000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	η	K_v'	η & K_v'			
τ	H_1	H_3	H_{11}	H_{41}	Effect of η	Effect of K_v'	Inter-action
0.005	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000
0.110	0.5000	0.5000	0.5000	0.5000	0.0000	0.0000	0.0000
0.200	0.6000	0.5000	0.6000	0.5000	-0.1000	0.0000	-0.0000
0.380	0.8000	0.7000	0.8000	0.7000	-0.1000	0.0000	0.0000
0.660	1.0000	0.8000	1.0000	0.8000	-0.2000	0.0000	0.0000
0.960	1.1000	0.9000	1.1000	0.9000	-0.2000	0.0000	-0.0000
1.280	1.2000	1.0000	1.2000	1.0000	-0.2000	0.0000	-0.0000
1.580	1.3000	1.1000	1.3000	1.1000	-0.2000	0.0000	0.0000
1.880	1.4000	1.2000	1.4000	1.2000	-0.2000	0.0000	0.0000

TABLE 13.--Continued.

Parameter Varied	None	η'	K_v	η' & K_v			
τ	H_1	H_{10}	H_6	H_{42}	Effect of η'	Effect of K_v	Inter-action
0.005	0.2000	0.3000	0.2000	0.3000	0.1000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.5000	0.1000	0.0000	0.0000
0.110	0.5000	0.7000	0.5000	0.7000	0.2000	0.0000	-0.0000
0.200	0.6000	0.8000	0.6000	0.8000	0.2000	0.0000	0.0000
0.380	0.8000	1.0000	0.8000	1.0000	0.2000	0.0000	0.0000
0.680	1.0000	1.2000	0.9000	1.2000	0.2500	-0.0500	0.0500
0.980	1.1000	1.4000	1.1000	1.4000	0.3000	0.0000	0.0000
1.280	1.2000	1.5000	1.2000	1.5000	0.3000	0.0000	0.0000
1.580	1.3000	1.6000	1.3000	1.6000	0.3000	0.0000	0.0000
1.880	1.4000	1.8000	1.4000	1.8000	0.4000	0.0000	0.0000

Table 14. Distribution of saturation, main effect, interactive effect along the axis of symmetry at the dimensionless time τ = 1.88, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$							
									Effect of			Interaction of			
Z	S_1	S_2	S_3	S_{12}	S_9	S_{16}	S_{25}	S_{43}	λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
2,000	0,9000	0,9000	0,9000	0,9000	0,9000	0,9000	0,9000	0,8225	0,0000	-0,0000	-0,0000	0,0000	0,0000	-0,0000	0,0000
1,800	0,8407	0,7623	0,8319	0,8281	0,8366	0,7492	0,6266	0,8225	-0,0435	0,0301	-0,0070	0,0394	-0,0024	0,0016	0,0021
1,600	0,7801	0,6646	0,7657	0,7605	0,7746	0,6482	0,7589	0,8225	-0,0633	0,0426	-0,0091	0,0577	-0,0029	0,0019	0,0025
1,400	0,7276	0,5968	0,7076	0,7040	0,7240	0,5835	0,7029	0,8225	-0,0699	0,0452	-0,0068	0,0658	-0,0026	0,0016	0,0022
1,200	0,6799	0,6391	0,6526	0,6531	0,6811	0,5329	0,6529	0,8225	-0,0471	0,0196	-0,0262	0,0473	-0,0270	0,0262	0,0267
1,000	0,6313	0,4774	0,5932	0,6011	0,6400	0,4814	0,6019	0,8225	-0,0743	0,0438	0,0074	0,0819	-0,0013	0,0010	0,0010
0,800	0,5746	0,3939	0,5190	0,5403	0,5942	0,4128	0,5407	0,8225	-0,0802	0,0463	0,0201	0,1008	-0,0005	0,0009	-0,0002
0,600	0,4977	0,2905	0,4036	0,4541	0,5346	0,3264	0,4475	0,8225	-0,0795	0,0376	0,0392	0,1202	-0,0012	0,0028	-0,0007
0,400	0,3615	0,2986	0,2356	0,3053	0,4352	0,3181	0,2927	0,8225	-0,0070	-0,0512	0,0550	0,0830	-0,0104	0,0084	0,0167
0,200	0,2546	0,3218	0,2288	0,2896	0,3265	0,3856	0,3014	0,8225	0,0606	-0,0280	0,0688	-0,0026	-0,0034	0,0010	0,0006
0,000	0,2563	0,3483	0,2244	0,3045	0,3438	0,4249	0,3156	0,8225	0,0810	-0,0356	0,0843	-0,0056	-0,0051	0,0022	0,0004

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$							
									Effect of			Interaction of			
Z	S_1	S_7	S_3	S_{13}	S_4	S_{17}	S_{24}	S_{44}	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
2,000	0,9000	0,9000	0,9000	0,9000	0,9000	0,9000	0,9000	0,8382	0,0000	-0,0000	-0,0000	0,0000	0,0000	-0,0000	0,0000
1,800	0,8407	0,8413	0,8319	0,8347	0,8442	0,8441	0,8363	0,8382	0,0013	-0,0073	0,0035	0,0010	-0,0004	0,0004	-0,0001
1,600	0,7801	0,7798	0,7657	0,7675	0,7846	0,7831	0,7713	0,8382	0,0001	-0,0129	0,0044	0,0010	-0,0007	0,0005	-0,0001
1,400	0,7276	0,7239	0,7076	0,7048	0,7296	0,7244	0,7107	0,8382	-0,0041	-0,0191	0,0017	0,0004	-0,0008	0,0005	-0,0001
1,200	0,6799	0,6708	0,6526	0,6425	0,6664	0,6654	0,6499	0,8382	-0,0081	-0,0250	-0,0066	-0,0031	0,0015	0,0028	-0,0026
1,000	0,6313	0,6152	0,5932	0,5737	0,6195	0,6004	0,5817	0,8382	-0,0194	-0,0397	-0,0133	-0,0018	-0,0016	0,0000	-0,0001
0,800	0,5746	0,5484	0,5190	0,4856	0,5507	0,5194	0,4936	0,8382	-0,0325	-0,0601	-0,0273	-0,0037	-0,0027	-0,0009	-0,0001
0,600	0,4977	0,4515	0,4036	0,3207	0,4544	0,3974	0,3497	0,8382	-0,0720	-0,1198	-0,0560	-0,0204	-0,0075	-0,0074	-0,0021
0,400	0,3615	0,2482	0,2356	0,2047	0,2745	0,1726	0,1799	0,8382	-0,0694	-0,0720	-0,0686	0,0382	0,0027	0,0127	-0,0030
0,200	0,2546	0,2126	0,2288	0,1945	0,1837	0,1384	0,1562	0,8382	-0,0398	-0,0228	-0,0734	0,0039	-0,0016	-0,0008	0,0000
0,000	0,2563	0,2069	0,2244	0,1858	0,1688	0,1136	0,1331	0,8382	-0,0466	-0,0281	-0,0920	0,0057	-0,0026	-0,0016	0,0003

Table 14. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda' P_b'$	S_r	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$	Effect of			Interaction of			
Z	S_1	S_7	S_8	S_{14}	S_4	S_{17}	S_{26}	S_{45}	λ'	P_b'	S_r	$\lambda' P_b'$	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$
2.000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.6404	0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
1.800	0.8407	0.8413	0.8530	0.6124	0.8442	0.8441	0.8551	0.6404	-0.1137	-0.1024	0.0091	-0.1140	0.0063	0.0060	0.0066
1.600	0.7601	0.7798	0.7984	0.5472	0.7846	0.7831	0.8012	0.6404	-0.1208	-0.1025	0.0086	-0.1199	0.0049	0.0047	0.0055
1.400	0.7276	0.7239	0.7493	0.4818	0.7296	0.7244	0.7500	0.6404	-0.1320	-0.1065	0.0050	-0.1275	0.0036	0.0037	0.0044
1.200	0.6799	0.6708	0.7055	0.4025	0.6664	0.6654	0.7015	0.6404	-0.1513	-0.1159	-0.0040	-0.1463	0.0047	0.0054	0.0007
1.000	0.6313	0.6152	0.6637	0.2804	0.6195	0.6004	0.6522	0.6404	-0.1990	-0.1488	-0.0109	-0.1814	0.0007	0.0024	0.0023
0.800	0.5746	0.5484	0.6191	0.2404	0.5507	0.5194	0.5972	0.6404	-0.2027	-0.1285	-0.0232	-0.1740	-0.0003	0.0033	0.0023
0.600	0.4977	0.4515	0.5660	0.2367	0.4544	0.3974	0.5296	0.6404	-0.1903	-0.0670	-0.0424	-0.1387	-0.0026	0.0063	0.0028
0.400	0.3615	0.2482	0.5955	0.2339	0.2745	0.1726	0.4349	0.6404	-0.2080	0.0968	-0.0943	-0.1004	0.0295	-0.0130	0.0238
0.200	0.2546	0.2126	0.3833	0.2317	0.1837	0.1384	0.2109	0.6404	-0.0726	0.0490	-0.0975	-0.0289	0.0242	-0.0249	0.0259
0.000	0.2563	0.2069	0.2986	0.2301	0.1688	0.1136	0.2044	0.6404	-0.0595	0.0318	-0.0914	-0.0072	-0.0006	-0.0010	0.0023

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r'	$\lambda' S_r'$	$P_b S_r'$	$\lambda' P_b S_r'$	Effect of			Interaction of			
Z	S_1	S_7	S_3	S_{13}	S_9	S_{18}	S_{25}	S_{46}	λ'	P_b	S_r'	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r'$	$\lambda' P_b S_r'$
2.000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.8306	0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
1.800	0.8407	0.8413	0.8319	0.8347	0.8366	0.8378	0.8268	0.8306	0.0021	-0.0081	-0.0042	0.0012	0.0004	-0.0004	0.0001
1.600	0.7801	0.7798	0.7657	0.7675	0.7746	0.7753	0.7589	0.8306	0.0013	-0.0139	-0.0056	0.0012	0.0006	-0.0005	0.0001
1.400	0.7276	0.7239	0.7076	0.7048	0.7240	0.7216	0.7029	0.8306	-0.0026	-0.0202	-0.0035	0.0004	0.0006	-0.0006	-0.0001
1.200	0.6799	0.6708	0.6526	0.6425	0.6811	0.6738	0.6529	0.8306	0.0164	-0.0032	0.0267	0.0246	0.0260	0.0246	0.0251
1.000	0.6313	0.6152	0.5932	0.5737	0.6400	0.6266	0.6019	0.8306	-0.0157	-0.0390	0.0108	-0.0009	0.0021	0.0007	0.0008
0.800	0.5746	0.5484	0.5190	0.4856	0.5942	0.5723	0.5407	0.8306	-0.0277	-0.0583	0.0227	-0.0037	0.0021	0.0010	-0.0001
0.600	0.4977	0.4515	0.4036	0.3207	0.5346	0.4971	0.4475	0.8306	-0.0576	-0.1064	0.0474	-0.0157	0.0070	0.0061	0.0026
0.400	0.3615	0.2482	0.2356	0.2047	0.4352	0.3341	0.2927	0.8306	-0.0693	-0.0963	0.0682	0.0379	0.0028	-0.0116	-0.0033
0.200	0.2546	0.2126	0.2288	0.1945	0.3265	0.2867	0.3014	0.8306	-0.0368	-0.0214	0.0736	0.0041	0.0014	0.0006	0.0003
0.000	0.2563	0.2069	0.2244	0.1858	0.3438	0.3002	0.3156	0.8306	-0.0414	-0.0250	0.0920	0.0051	0.0026	0.0015	-0.0003

Table 14. Continued.

Parameter Varied	None	λ'	P_b'	$λ'P_b'$	S_r'	$λ'S_r'$	$P_b'S_r'$	$λ'P_b'S_r'$	Effect of			Interaction of			
Z	S_1	S_7	S_8	S_{14}	S_9	S_{18}	S_{27}	S_{47}	λ'	P_b'	S_r'	$λ'P_b'$	$λ'S_r'$	$P_b'S_r'$	$λ'P_b'S_r'$
2.000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9809	0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
1.800	0.6407	0.8413	0.8530	0.6124	0.8366	0.8378	0.8503	0.9809	-0.0270	-0.0149	0.0895	-0.0279	0.0930	0.0933	0.0927
1.600	0.7801	0.7798	0.7984	0.5472	0.7746	0.7753	0.7945	0.9809	-0.1314	-0.1126	-0.0104	-0.1316	-0.0057	-0.0054	-0.0062
1.400	0.7276	0.7239	0.7493	0.4818	0.7240	0.7216	0.7470	0.9809	-0.1400	-0.1146	-0.0074	-0.1370	-0.0044	-0.0044	-0.0051
1.200	0.6799	0.6708	0.7055	0.4025	0.6811	0.6738	0.7076	0.9809	-0.1594	-0.1251	-0.0017	-0.1512	-0.0033	-0.0038	-0.0042
1.000	0.6313	0.6152	0.6637	0.2804	0.6400	0.6266	0.6724	0.9809	-0.2015	-0.1543	0.0069	-0.1867	-0.0018	-0.0031	-0.0031
0.800	0.5746	0.5484	0.6191	0.2404	0.5942	0.5723	0.6373	0.9809	-0.2015	-0.1336	0.0199	-0.1774	0.0010	-0.0018	-0.0012
0.600	0.4977	0.4515	0.5660	0.2367	0.5346	0.4971	0.5979	0.9809	-0.1846	-0.0769	0.0376	-0.1427	0.0032	-0.0037	-0.0012
0.400	0.3615	0.2482	0.5955	0.2339	0.4352	0.3341	0.5472	0.9809	-0.2088	0.0714	0.0413	-0.1016	0.0286	-0.0385	0.0225
0.200	0.2546	0.2126	0.3833	0.2317	0.3265	0.2867	0.4718	0.9809	-0.1003	0.0776	0.0767	-0.0594	-0.0035	0.0037	-0.0046
0.000	0.2563	0.2069	0.2986	0.2301	0.3438	0.3002	0.4020	0.9809	-0.0607	0.0361	0.0937	-0.0142	-0.0018	0.0033	-0.0046

Table 15. Distribution of capillary pressure, main effect, and interactive effect along the axis of symmetry at the dimensionless time τ = 1.88, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$	Effect of			Interaction of			
Z	P_{c_1}	P_{c_2}	P_{c_3}	$P_{c_{12}}$	P_{c_9}	$P_{c_{16}}$	$P_{c_{25}}$	$P_{c_{43}}$	λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
2.000	1,1333	1,1011	1,4733	1,4314	1,1176	1,0893	1,4529	1,4710	-0,0348	0,3331	-0,0158	-0,0046	0,0023	-0,0020	0,0003
1.800	1,2307	1,3029	1,5458	1,4878	1,2131	1,2885	1,5238	1,4710	0,0092	0,2483	-0,0177	-0,0646	0,0021	-0,0017	0,0005
1.600	1,3489	1,5300	1,6291	1,5620	1,3292	1,5131	1,6053	1,4710	0,0590	0,1547	-0,0197	-0,1235	0,0020	-0,0014	0,0006
1.400	1,4716	1,7758	1,7073	1,6414	1,4495	1,7566	1,6814	1,4710	0,1211	0,0493	-0,0220	-0,1845	0,0020	-0,0013	0,0006
1.200	1,6042	2,0699	1,7928	1,7385	1,5788	2,0674	1,7635	1,4710	0,2176	-0,0829	-0,0255	-0,2696	0,0019	-0,0015	0,0004
1.000	1,7662	2,5964	1,9177	1,8841	1,7348	2,5653	1,8811	1,4710	0,3993	-0,2821	-0,0330	-0,4311	0,0010	-0,0018	0,0009
0.800	2,0017	3,7737	2,1654	2,1512	1,9565	3,6982	2,1070	1,4710	0,8721	-0,7277	-0,0586	-0,8848	-0,0069	0,0017	0,0083
0.600	2,4445	7,7304	2,9495	2,8295	2.3504	7,5716	2,7681	1,4710	2,5737	-2,2185	-0,1470	-2,6799	-0,0093	-0,0206	0,0231
0.400	4,0195	8,3904	8,1294	6,5172	3,5087	8,3871	7,8289	1,4710	1,3371	0,9275	-0,4479	-3,2876	-0,0423	-0,1908	-0,2960
0.200	8,1231	8,2000	8,1999	8,1899	7,9779	8,1999	8,1998	1,4710	0,0653	0,0651	-0,0409	-0,0842	0,0318	0,0318	-0,0407
0.000	7,9998	8,0000	8,0000	7,9999	7,9992	8,0000	8,0000	1,4710	0,0002	0,0002	-0,0002	-0,0003	0,0001	0,0001	-0,0002

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$	Effect of			Interaction of			
Z	P_{c_1}	P_{c_7}	P_{c_3}	$P_{c_{13}}$	P_{c_4}	$P_{c_{17}}$	$P_{c_{24}}$	$P_{c_{44}}$	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
2.000	1,1333	1,1958	1,4733	1,5545	1,1538	1,2268	1,5000	1,6914	0,0779	0,3532	0,0297	0,0101	0,0060	0,0039	0,0008
1.800	1,2307	1,3126	1,5458	1,6483	1,2537	1,3467	1,5748	1,6914	0,0985	0,3292	0,0323	0,0110	0,0063	0,0037	0,0008
1.600	1,3489	1,4415	1,6291	1,7422	1,3749	1,4790	1,6608	1,6914	0,1094	0,2941	0,0354	0,0110	0,0066	0,0036	0,0008
1.400	1,4716	1,5626	1,7073	1,8188	1,5011	1,6042	1,7423	1,6914	0,1081	0,2495	0,0391	0,0111	0,0069	0,0036	0,0008
1.200	1,6042	1,6836	1,7928	1,8943	1,6389	1,7315	1,8332	1,6914	0,0980	0,2034	0,0451	0,0120	0,0075	0,0038	0,0010
1.000	1,7662	1,8270	1,9177	2,0060	1,8104	1,8871	1,9691	1,6914	0,0840	0,1703	0,0572	0,0152	0,0094	0,0050	0,0015
0.800	2,0017	2,0439	2,1654	2,2590	2,0681	2,1348	2,2492	1,6914	0,0840	0,2019	0,0912	0,0295	0,0161	0,0125	0,0038
0.600	2,4445	2,5226	2,9495	3,6897	2,5841	2,7436	3,2677	1,6914	0,5914	1,0669	0,4111	0,4726	0,1822	0,2308	0,1415
0.400	4,0195	6,2283	8,1294	8,3913	4,9320	7,6371	8,2968	1,6914	1,3192	2,5996	0,6238	-1,1378	0,0838	-0,5369	-0,1644
0.200	8,1231	8,1992	8,1999	8,2000	8,1779	8,1999	8,2000	1,6914	0,0246	0,0249	0,0139	-0,0245	-0,0136	-0,0139	0,0135
0.000	7,9998	8,0000	8,0000	8,0000	8,0000	8,0000	8,0000	1,6914	0,0000	0,0001	0,0001	-0,0001	-0,0001	-0,0001	0,0001

Table 15. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda'P_b'$	S_r	$\lambda'S_r$	$P_b'S_r$	$\lambda'P_b'S_r$							
									Effect of			Interaction of			
Z	P_{c_1}	P_{c_7}	P_{c_8}	$P_{c_{14}}$	P_{c_4}	$P_{c_{17}}$	$P_{c_{26}}$	$P_{c_{45}}$	λ'	P_b'	S_r	$\lambda'P_b'$	$\lambda'S_r$	$P_b'S_r$	$\lambda'P_b'S_r$
2,000	1,1333	1,1958	0,7933	0,8371	1,1538	1,2268	0,8077	1,7395	0,0576	-0,3532	0,0219	-0,0102	0,0045	-0,0039	-0,0008
1,800	1,2307	1,3126	0,9190	0,6931	1,2537	1,3467	0,9362	1,7395	0,1881	-0,2140	0,2802	0,1006	0,2601	0,2516	0,2545
1,600	1,3489	1,4415	1,0750	2,0738	1,3749	1,4790	1,0957	1,7395	0,5577	0,1828	0,0354	0,4594	0,0120	0,0036	0,0063
1,400	1,4716	1,5626	1,2482	2,5630	1,5011	1,6042	1,2728	1,7395	0,7178	0,3949	0,0419	0,6207	0,0149	0,0064	0,0088
1,200	1,6042	1,6836	1,4383	3,4189	1,6389	1,7315	1,4680	1,7395	1,0535	0,7991	0,0557	0,9675	0,0235	0,0144	0,0169
1,000	1,7662	1,8270	1,6548	6,5190	1,8104	1,8871	1,6927	1,7395	2,5281	2,3448	0,1067	2,4594	0,0656	0,0545	0,0577
0,800	2,0017	2,0439	1,9205	8,7802	2,0681	2,1348	1,9738	1,7395	3,4448	3,3026	0,0537	3,3903	-0,0062	-0,0250	-0,0184
0,600	2,4445	2,5226	2,2883	8,6000	2,5841	2,7436	2,3755	1,7395	3,1934	2,8923	0,1119	3,0746	-0,0015	-0,0684	-0,0421
0,400	4,0195	6,2283	2,9030	8,4000	4,9320	7,6371	3,1135	1,7395	3,9244	-0,0001	0,6330	1,4674	0,0714	-0,5277	-0,1767
0,200	8,1231	8,1992	4,5168	8,2000	8,1779	8,1999	5,5220	1,7395	1,6148	-1,5653	0,2652	1,5658	-0,2648	0,2374	-0,2378
0,000	7,9998	8,0000	7,4354	8,0000	8,0000	8,0000	7,8553	1,7395	0,1774	-0,1773	0,1050	0,1773	-0,1050	0,1049	-0,1049

Parameter Varied	None	λ'	P_b	$\lambda'P_b$	S_r'	$\lambda'S_r'$	P_bS_r'	$\lambda'P_bS_r'$							
									Effect of			Interaction of			
Z	P_{c_1}	P_{c_7}	P_{c_3}	$P_{c_{13}}$	P_{c_9}	$P_{c_{18}}$	$P_{c_{25}}$	$P_{c_{46}}$	λ'	P_b	S_r'	$\lambda'P_b$	$\lambda'S_r$	P_bS_r'	$\lambda'P_bS_r'$
2,000	1,1333	1,1958	1,4733	1,5545	1,1176	1,1722	1,4529	1,6156	0,0673	0,3464	-0,0226	0,0068	-0,0045	-0,0029	-0,0006
1,800	1,2307	1,3126	1,5458	1,6483	1,2131	1,2867	1,5238	1,6156	0,0875	0,3226	-0,0246	0,0097	-0,0047	-0,0028	-0,0006
1,600	1,3489	1,4415	1,6291	1,7422	1,3292	1,4132	1,6053	1,6156	0,0979	0,2878	-0,0267	0,0096	-0,0049	-0,0026	-0,0006
1,400	1,4716	1,5626	1,7073	1,8188	1,4495	1,5315	1,6814	1,6156	0,0961	0,2434	-0,0291	0,0096	-0,0051	-0,0025	-0,0006
1,200	1,6042	1,6836	1,7928	1,8943	1,5788	1,6484	1,7635	1,6156	0,0848	0,1970	-0,0330	0,0103	-0,0056	-0,0027	-0,0007
1,000	1,7662	1,8270	1,9177	2,0060	1,7348	1,7836	1,8811	1,6156	0,0674	0,1615	-0,0412	0,0126	-0,0072	-0,0037	-0,0011
0,800	2,0017	2,0439	2,1654	2,2590	1,9565	1,7801	2,1070	1,6156	0,0068	0,2310	-0,1129	0,0738	-0,0612	0,0415	0,0481
0,600	2,4445	2,5226	2,9495	3,6897	2,3504	2,3770	2,7681	1,6156	0,3083	0,7173	-0,2386	0,2560	-0,1008	-0,1187	-0,0751
0,400	4,0195	6,2283	8,1294	8,3913	3,5087	4,8008	7,8289	1,6156	1,0770	3,5416	-0,5641	-0,6735	-0,1584	0,4051	0,3000
0,200	8,1231	8,1992	8,1999	8,2000	7,9779	8,1964	8,1998	1,6156	0,0737	0,0758	-0,0370	-0,0736	0,0356	0,0370	-0,0356
0,000	7,9998	8,0000	8,0000	8,0000	7,9992	8,0000	8,0000	1,6156	0,0002	0,0003	-0,0002	-0,0003	0,0001	0,0002	-0,0002

Table 15. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda'P_b'$	S_r'	$\lambda'S_r'$	$P_b'S_r'$	$\lambda'P_b'S_r'$	Effect of			Interaction of			
Z	P_{c_1}	P_{c_7}	P_{c_8}	$P_{c_{14}}$	P_{c_9}	$P_{c_{18}}$	$P_{c_{27}}$	$P_{c_{47}}$	λ'	P_b'	S_r'	$\lambda'P_b'$	$\lambda'S_r'$	$P_b'S_r'$	$\lambda'P_b'S_r'$
2,000	1,1333	1,1958	0,7933	0,8371	1,1176	1,1722	0,7824	1,6717	0,0498	-0,3464	-0,0167	-0,0088	-0,0034	0,0029	0,0005
1,800	1,2307	1,3126	0,9190	0,6931	1,2131	1,2867	0,9058	1,6717	0,1739	-0,2134	0,2305	0,0961	0,2459	0,2522	0,2500
1,600	1,3489	1,4415	1,0750	2,0738	1,3292	1,4132	1,0592	1,6717	0,5412	0,1810	-0,0222	0,4529	-0,0045	0,0018	-0,0002
1,400	1,4716	1,5626	1,2482	2,5630	1,4495	1,5315	1,2295	1,6717	0,6990	0,3907	-0,0243	0,6125	-0,0039	0,0023	0,0006
1,200	1,6042	1,6836	1,4383	3,4189	1,5788	1,6484	1,4160	1,6717	1,0284	0,7896	-0,0254	0,9539	-0,0016	0,0049	0,0033
1,000	1,7662	1,8270	1,6548	6,5190	1,7348	1,7836	1,6270	1,6717	2,4792	2,3148	-0,0129	2,4244	0,0167	0,0245	0,0227
0,800	2,0017	2,0439	1,9205	8,7802	1,9565	1,7801	1,8827	1,6717	3,4061	3,3957	-0,0864	3,4732	-0,0449	0,0681	0,0644
0,600	2,4445	2,5226	2,2883	8,6000	2,3504	2,3770	2,2240	1,6717	3,1981	3,0045	-0,0760	3,1457	0,0032	0,0439	0,0290
0,400	4,0195	6,2283	2,9030	8,4000	3,5087	4,8008	2,7643	1,6717	3,6584	0,9775	-0,5193	1,9080	-0,1945	0,4499	0,2639
0,200	8,1231	8,1992	4,5168	8,2000	7,9779	8,1964	3,9490	1,6717	2,0572	-1,9077	-0,1790	1,9099	0,1776	-0,1050	0,1064
0,000	7,9998	8,0000	7,4354	8,0000	7,9992	8,0000	6,4140	1,6717	0,5379	-0,5374	-0,2555	0,5374	0,2555	-0,2552	0,2552

Table 16. Infiltration rate, main effect, and interactive effect at different dimensionless time steps, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$							
τ	f_1	f_2	f_3	f_{12}	f_9	f_{16}	f_{25}	f_{43}	Effect of			Interaction of			
									λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
0.005	1.2217	2.2992	1.2872	2.3056	1.3646	2.5274	1.4334	1.0620	1.0883	0.0353	0.1849	-0.0318	0.0404	-0.0006	-0.0023
0.020	0.7111	0.7878	0.7876	0.9779	0.7765	0.8548	0.8601	1.0620	0.1368	0.1393	0.0723	0.0593	0.0033	0.0061	0.0025
0.050	0.5553	0.4295	0.6195	0.6678	0.6011	0.4582	0.6693	1.0620	-0.0425	0.1581	0.0441	0.0919	-0.0037	0.0068	0.0048
0.110	0.4734	0.2800	0.5264	0.5313	0.5084	0.2959	0.5655	1.0620	-0.0992	0.1588	0.0321	0.1037	-0.0050	0.0066	0.0046
0.200	0.4321	0.2173	0.4765	0.4678	0.4628	0.2287	0.5102	1.0620	-0.1171	0.1533	0.0269	0.1074	-0.0053	0.0059	0.0043
0.380	0.3992	0.1760	0.4353	0.4218	0.4259	0.1852	0.4649	1.0620	-0.1233	0.1462	0.0232	0.1087	-0.0049	0.0053	0.0038
0.680	0.3818	0.1531	0.4102	0.3941	0.4064	0.1612	0.4370	1.0620	-0.1258	0.1407	0.0223	0.1112	-0.0034	0.0060	0.0049
0.980	0.3783	0.1436	0.4004	0.3824	0.4023	0.1511	0.4264	1.0620	-0.1302	0.1359	0.0212	0.1128	-0.0038	0.0054	0.0044
1.280	0.3774	0.1384	0.3947	0.3759	0.4013	0.1454	0.4203	1.0620	-0.1331	0.1325	0.0205	0.1143	-0.0042	0.0051	0.0042
1.580	0.3771	0.1349	0.3909	0.3716	0.4010	0.1418	0.4161	1.0620	-0.1351	0.1300	0.0202	0.1156	-0.0044	0.0048	0.0041
1.880	0.3771	0.1325	0.3880	0.3686	0.4010	0.1392	0.4130	1.0620	-0.1366	0.1281	0.0199	0.1166	-0.0046	0.0046	0.0041

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$							
τ	f_1	f_7	f_3	f_{13}	f_4	f_{17}	f_{24}	f_{44}	Effect of			Interaction of			
									λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
0.005	1.2217	1.6939	1.2872	1.6301	1.0760	1.4888	1.1375	0.8412	0.3824	0.0033	-0.1729	-0.0602	-0.0252	0.0025	0.0045
0.020	0.7111	0.8997	0.7876	0.9378	0.6407	0.8042	0.7102	0.8412	0.1583	0.0553	-0.0850	-0.0177	-0.0111	-0.0020	0.0015
0.050	0.5553	0.6745	0.6195	0.7170	0.5049	0.6078	0.5646	0.8412	0.1006	0.0515	-0.0605	-0.0105	-0.0078	-0.0019	0.0003
0.110	0.4734	0.5582	0.5264	0.5971	0.4338	0.5054	0.4822	0.8412	0.0715	0.0440	-0.0482	-0.0067	-0.0062	-0.0020	0.0003
0.200	0.4321	0.4991	0.4765	0.5333	0.3973	0.4531	0.4379	0.8412	0.0566	0.0376	-0.0420	-0.0049	-0.0053	-0.0016	0.0003
0.380	0.3992	0.4535	0.4353	0.4820	0.3685	0.4126	0.4010	0.8412	0.0457	0.0308	-0.0373	-0.0035	-0.0048	-0.0015	0.0003
0.680	0.3816	0.4256	0.4102	0.4492	0.3531	0.3877	0.3787	0.8412	0.0370	0.0248	-0.0345	-0.0022	-0.0044	-0.0012	0.0002
0.980	0.3783	0.4137	0.4004	0.4331	0.3499	0.3771	0.3698	0.8412	0.0300	0.0197	-0.0335	-0.0013	-0.0040	-0.0010	0.0001
1.280	0.3774	0.4067	0.3947	0.4229	0.3490	0.3707	0.3646	0.8412	0.0251	0.0160	-0.0329	-0.0004	-0.0037	-0.0007	0.0001
1.580	0.3771	0.4019	0.3909	0.4157	0.3487	0.3663	0.3611	0.8412	0.0213	0.0132	-0.0326	0.0001	-0.0035	-0.0006	0.0001
1.880	0.3771	0.3983	0.3880	0.4102	0.3487	0.3631	0.3585	0.8412	0.0184	0.0109	-0.0323	0.0005	-0.0033	-0.0005	0.0001

Table 16. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda' P_b'$	S_r	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$							
									Effect of			Interaction of			
τ	f_1	f_7	f_8	f_{14}	f_4	f_{17}	f_{26}	f_{45}	λ'	P_b'	S_r	$\lambda' P_b'$	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$
0.005	1.2217	1.6939	0.7933	1.8666	1.0760	1.4888	1.0170	0.5662	0.6448	-0.0414	-0.0889	0.2023	-0.1279	0.0864	-0.0982
0.020	0.7111	0.8997	0.9190	0.6392	0.6407	0.8042	0.5568	0.5662	0.0204	-0.0936	-0.1503	-0.1556	0.0660	-0.0673	0.0786
0.050	0.5553	0.6745	1.0750	0.3289	0.5049	0.6078	0.4418	0.5662	-0.1681	-0.0508	-0.1964	-0.2791	0.1454	-0.1379	0.1535
0.110	0.4734	0.5582	1.2482	0.2004	0.4338	0.5054	0.3827	0.5662	-0.2737	0.0100	-0.2447	-0.3518	0.2079	-0.1985	0.2149
0.200	0.4321	0.4991	1.4383	0.1555	0.3973	0.4531	0.3569	0.5662	-0.3465	0.0750	-0.2967	-0.4079	0.2614	-0.2563	0.2670
0.380	0.3992	0.4535	1.6548	0.1083	0.3685	0.4126	0.3359	0.5662	-0.4216	0.1407	-0.3503	-0.4708	0.3245	-0.3145	0.3296
0.680	0.3818	0.4256	1.9205	0.0869	0.3531	0.3877	0.3281	0.5662	-0.5012	0.2164	-0.4169	-0.5404	0.3937	-0.3835	0.3983
0.980	0.3783	0.4137	2.2883	0.0778	0.3499	0.3771	0.3281	0.5662	-0.6014	0.3114	-0.5082	-0.6327	0.4861	-0.4757	0.4902
1.280	0.3774	0.4067	2.9030	0.0726	0.3490	0.3707	0.3281	0.5662	-0.7605	0.4664	-0.6616	-0.7860	0.6401	-0.6294	0.6439
1.580	0.3771	0.4019	4.5168	0.0699	0.3487	0.3663	0.3281	0.5662	-1.1675	0.8709	-1.0650	-1.1887	1.0436	-1.0330	1.0472
1.880	0.3771	0.3983	7.4354	0.0673	0.3487	0.3631	0.3281	0.5662	-1.9000	1.6011	-1.7944	-1.9178	1.7735	-1.7626	1.7769

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r'	$\lambda' S_r'$	$P_b S_r'$	$\lambda' P_b S_r'$							
									Effect of			Interaction of			
τ	f_1	f_7	f_3	f_{13}	f_9	f_{18}	f_{25}	f_{46}	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r'$	$\lambda' P_b S_r'$
0.005	1.2217	1.6939	1.2872	1.6301	1.3646	1.8948	1.4334	1.0270	0.4313	-0.0028	0.1682	-0.0700	0.0237	-0.0037	-0.0053
0.020	0.7111	0.8997	0.7876	0.9378	0.7765	0.9885	0.8601	1.0270	0.1794	0.0592	0.0790	-0.0209	0.0100	0.0019	-0.0017
0.050	0.5553	0.6745	0.6195	0.7170	0.6011	0.7349	0.6693	1.0270	0.1153	0.0550	0.0547	-0.0112	0.0070	0.0017	-0.0003
0.110	0.4734	0.5582	0.5264	0.5971	0.5084	0.6052	0.5655	1.0270	0.0834	0.0476	0.0427	-0.0074	0.0056	0.0017	-0.0004
0.200	0.4321	0.4991	0.4765	0.5333	0.4628	0.5397	0.5102	1.0270	0.0667	0.0406	0.0370	-0.0053	0.0048	0.0013	-0.0002
0.380	0.3992	0.4535	0.4353	0.4820	0.4259	0.4889	0.4649	1.0270	0.0547	0.0336	0.0324	-0.0039	0.0042	0.0013	-0.0001
0.680	0.3818	0.4256	0.4102	0.4492	0.4064	0.4582	0.4370	1.0270	0.0453	0.0270	0.0296	-0.0025	0.0039	0.0010	-0.0001
0.980	0.3783	0.4137	0.4004	0.4331	0.4023	0.4451	0.4264	1.0270	0.0376	0.0217	0.0286	-0.0015	0.0036	0.0009	-0.0001
1.280	0.3774	0.4067	0.3947	0.4229	0.4013	0.4375	0.4203	1.0270	0.0321	0.0175	0.0281	-0.0006	0.0034	0.0008	-0.0001
1.580	0.3771	0.4019	0.3909	0.4157	0.4010	0.4322	0.4161	1.0270	0.0280	0.0144	0.0277	-0.0000	0.0032	0.0006	-0.0000
1.880	0.3771	0.3983	0.3880	0.4102	0.4010	0.4222	0.4130	1.0270	0.0232	0.0135	0.0260	0.0020	0.0015	0.0021	0.0015

Table 16. Continued.

Parameter Varied	None	λ'	P_b'	λ'P_b'	S_r'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'	Effect of			Interaction of			
τ	f_1	f_7	f_8	f_{14}	f_9	f_{18}	f_{27}	f_{47}	λ'	P_b'	S_r'	λ'P_b'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'
0,005	1,2217	1,6939	0,7933	1,8666	1,3646	1,8948	1,2978	0,7069	0,7161	-0,0327	0,2671	0,2149	-0,0566	0,0952	-0,0856
0,020	0,7111	0,8997	0,9190	0,6392	0,7765	0,9885	0,6730	0,7069	0,0387	-0,1094	-0,0060	-0,1616	0,0843	-0,0831	0,0726
0,050	0,5553	0,6745	1,0750	0,3289	0,6011	0,7349	0,5244	0,7069	-0,1643	-0,0693	-0,1032	-0,2908	0,1492	-0,1563	0,1410
0,110	0,4734	0,5582	1,2482	0,2004	0,5084	0,6052	0,4501	0,7069	-0,2745	-0,0071	-0,1746	-0,3653	0,2070	-0,2156	0,2010
0,200	0,4321	0,4991	1,4383	0,1555	0,4628	0,5397	0,1146	0,7069	-0,2740	-0,0170	-0,3126	-0,3459	0,3339	-0,3482	0,3289
0,380	0,3992	0,4535	1,6548	0,1083	0,4259	0,4889	0,3879	0,7069	-0,4252	0,1250	-0,2992	-0,4838	0,3209	-0,3302	0,3166
0,680	0,3818	0,4256	1,9205	0,0869	0,4064	0,4582	0,3769	0,7069	-0,5055	0,2013	-0,3701	-0,5533	0,3894	-0,3987	0,3854
0,980	0,3783	0,4137	2,2883	0,0778	0,4023	0,4451	0,3769	0,7069	-0,6066	0,2967	-0,4627	-0,6457	0,4810	-0,4904	0,4775
1,280	0,3774	0,4067	2,9030	0,0726	0,4013	0,4375	0,3769	0,7069	-0,7661	0,4518	-0,6167	-0,7989	0,6345	-0,6440	0,6310
1,580	0,3771	0,4019	4,5168	0,0699	0,4010	0,4322	0,3769	0,7069	-1,1735	0,8563	-1,0205	-1,2015	1,0375	-1,0476	1,0343
1,880	0,3771	0,3983	7,4354	0,0673	0,4010	0,4222	0,3769	0,7069	-1,9079	1,5880	-1,7517	-1,9291	1,7656	-1,7756	1,7656

Table 17. Volume of water applied, main effect, and interactive effect at different dimensionless time steps, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$							
									Effect of			Interaction of			
τ	W_1	W_2	W_3	W_{12}	W_9	W_{16}	W_{25}	W43	λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
0.005	0.0061	0.0114	0.0064	0.0115	0.0068	0.0126	0.0071	0.0212	0.0054	0.0002	0.0009	-0.0001	0.0002	-0.0000	-0.0000
0.020	0.0142	0.0157	0.0157	0.0195	0.0155	0.0170	0.0172	0.0212	0.0027	0.0028	0.0014	0.0012	0.0000	0.0001	0.0000
0.050	0.0277	0.0214	0.0309	0.0333	0.0300	0.0229	0.0334	0.0212	-0.0021	0.0079	0.0022	0.0046	-0.0002	0.0003	0.0002
0.110	0.0520	0.0308	0.0579	0.0584	0.0559	0.0325	0.0622	0.0212	-0.0109	0.0175	0.0035	0.0114	-0.0006	0.0007	0.0005
0.200	0.0864	0.0434	0.0953	0.0935	0.0925	0.0457	0.1020	0.0212	-0.0234	0.0307	0.0054	0.0215	-0.0010	0.0012	0.0009
0.380	0.1517	0.0668	0.1654	0.1602	0.1618	0.0703	0.1766	0.0212	-0.0469	0.0556	0.0088	0.0413	-0.0018	0.0020	0.0015
0.680	0.2596	0.1040	0.2789	0.2679	0.2763	0.1095	0.2971	0.0212	-0.0856	0.0957	0.0152	0.0756	-0.0023	0.0041	0.0033
0.980	0.3707	0.1407	0.3924	0.3747	0.3942	0.1481	0.4179	0.0212	-0.1276	0.1332	0.0208	0.1105	-0.0038	0.0053	0.0043
1.280	0.4830	0.1770	0.5052	0.4811	0.5136	0.1861	0.5379	0.0212	-0.1704	0.1696	0.0263	0.1463	-0.0054	0.0064	0.0054
1.580	0.5957	0.2131	0.6175	0.5871	0.6335	0.2240	0.6573	0.0212	-0.2134	0.2054	0.0319	0.1826	-0.0069	0.0075	0.0065
1.880	0.7089	0.2491	0.7295	0.6929	0.7538	0.2616	0.7764	0.0212	-0.2567	0.2409	0.0374	0.2193	-0.0085	0.0087	0.0077

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$							
									Effect of			Interaction of			
τ	W_1	W_7	W_3	W_{13}	W_4	W_{17}	W_{24}	W_{44}	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
0.005	0.0061	0.0084	0.0064	0.0081	0.0053	0.0074	0.0056	0.0168	0.0019	0.0000	-0.0009	-0.0003	-0.0001	-0.0000	0.0000
0.020	0.0142	0.0179	0.0157	0.0187	0.0128	0.0160	0.0142	0.0168	0.0031	0.0011	-0.0017	-0.0003	-0.0002	-0.0000	0.0000
0.050	0.0277	0.0337	0.0309	0.0358	0.0252	0.0303	0.0282	0.0168	0.0050	0.0026	-0.0030	-0.0005	-0.0004	-0.0001	0.0000
0.110	0.0520	0.0614	0.0579	0.0656	0.0477	0.0555	0.0530	0.0168	0.0079	0.0049	-0.0053	-0.0008	-0.0007	-0.0002	0.0001
0.200	0.0864	0.0998	0.0953	0.1066	0.0794	0.0906	0.0875	0.0168	0.0113	0.0075	-0.0085	-0.0010	-0.0011	-0.0004	0.0000
0.380	0.1517	0.1723	0.1654	0.1831	0.1400	0.1567	0.1523	0.0168	0.0174	0.0117	-0.0142	-0.0013	-0.0018	-0.0005	0.0001
0.680	0.2596	0.2893	0.2789	0.3054	0.2400	0.2636	0.2575	0.0168	0.0252	0.0169	-0.0234	-0.0015	-0.0030	-0.0008	0.0001
0.980	0.3707	0.4054	0.3924	0.4244	0.3428	0.3695	0.3623	0.0168	0.0295	0.0194	-0.0328	-0.0012	-0.0038	-0.0009	0.0002
1.280	0.4830	0.5205	0.5052	0.5412	0.4467	0.4744	0.4666	0.0168	0.0320	0.0205	-0.0422	-0.0005	-0.0047	-0.0009	0.0002
1.580	0.5957	0.6349	0.6175	0.6567	0.5509	0.5787	0.5705	0.0168	0.0337	0.0209	-0.0514	0.0002	-0.0055	-0.0009	0.0002
1.880	0.7089	0.7488	0.7295	0.7711	0.6554	0.6825	0.6739	0.0168	0.0345	0.0206	-0.0608	0.0010	-0.0062	-0.0009	0.0001

Table 17. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda' P_b'$	S_r	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$	Effect of			Interaction of			
τ	W_1	W_7	W_8	W_{14}	W_4	W_{17}	W_{26}	W_{45}	λ'	P_b'	S_r	$\lambda' P_b'$	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$
0.005	0.0061	0.0084	0.0057	0.0093	0.0053	0.0074	0.0050	0.0113	0.0028	0.0002	-0.0009	0.0006	-0.0002	-0.0000	-0.0001
0.020	0.0142	0.0179	0.0123	0.0127	0.0128	0.0160	0.0111	0.0113	0.0019	-0.0034	-0.0015	-0.0016	-0.0002	0.0002	0.0001
0.050	0.0277	0.0337	0.0242	0.0164	0.0252	0.0303	0.0220	0.0113	-0.0010	-0.0099	-0.0025	-0.0066	-0.0001	0.0005	0.0003
0.110	0.0520	0.0614	0.0460	0.0220	0.0477	0.0555	0.0421	0.0113	-0.0073	-0.0217	-0.0041	-0.0159	0.0000	0.0010	0.0008
0.200	0.0864	0.0998	0.0775	0.0291	0.0794	0.0906	0.0713	0.0113	-0.0173	-0.0381	-0.0063	-0.0296	0.0002	0.0018	0.0014
0.380	0.1517	0.1723	0.1383	0.0411	0.1400	0.1567	0.1276	0.0113	-0.0376	-0.0692	-0.0105	-0.0563	0.0007	0.0031	0.0026
0.680	0.2596	0.2893	0.2410	0.0590	0.2400	0.2636	0.2230	0.0113	-0.0746	-0.1191	-0.0172	-0.1013	0.0016	0.0054	0.0046
0.980	0.3707	0.4054	0.3511	0.0762	0.3428	0.3695	0.3250	0.0113	-0.1174	-0.1668	-0.0243	-0.1481	0.0027	0.0076	0.0067
1.280	0.4830	0.5205	0.4645	0.0929	0.4467	0.4744	0.4299	0.0113	-0.1631	-0.2133	-0.0315	-0.1957	0.0040	0.0098	0.0089
1.560	0.5957	0.6349	0.5798	0.1094	0.5509	0.5787	0.5364	0.0113	-0.2102	-0.2589	-0.0387	-0.2437	0.0054	0.0118	0.0111
1.880	0.7089	0.7488	0.6961	0.1225	0.6554	0.6825	0.6437	0.0113	-0.2591	-0.3049	-0.0452	-0.2926	0.0078	0.0147	0.0141

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r'	$\lambda' S_r'$	$P_b S_r'$	$\lambda' P_b S_r'$	Effect of			Interaction of			
τ	W_1	W_7	W_3	W_{13}	W_9	W_{18}	W_{25}	W_{45}	λ'	P_b	S_r'	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r'$	$\lambda' P_b S_r'$
0.005	0.0061	0.0084	0.0064	0.0081	0.0068	0.0094	0.0071	0.0205	0.0021	-0.0000	0.0008	-0.0003	0.0001	-0.0000	-0.0000
0.020	0.0142	0.0179	0.0157	0.0187	0.0155	0.0197	0.0172	0.0205	0.0036	0.0012	0.0016	-0.0004	0.0002	0.0001	-0.0001
0.050	0.0277	0.0337	0.0309	0.0358	0.0300	0.0367	0.0334	0.0205	0.0058	0.0027	0.0028	-0.0005	0.0004	0.0001	-0.0000
0.110	0.0520	0.0614	0.0579	0.0656	0.0559	0.0665	0.0622	0.0205	0.0091	0.0052	0.0047	-0.0009	0.0006	0.0002	0.0000
0.200	0.0864	0.0998	0.0953	0.1066	0.0925	0.1079	0.1020	0.0205	0.0133	0.0081	0.0074	-0.0011	0.0010	0.0003	-0.0000
0.380	0.1517	0.1723	0.1654	0.1831	0.1618	0.1857	0.1766	0.0205	0.0208	0.0128	0.0123	-0.0015	0.0016	0.0005	-0.0000
0.680	0.2596	0.2893	0.2789	0.3054	0.2763	0.3115	0.2971	0.0205	0.0308	0.0183	0.0201	-0.0017	0.0026	0.0007	-0.0001
0.980	0.3707	0.4054	0.3924	0.4244	0.3942	0.4362	0.4179	0.0205	0.0369	0.0212	0.0280	-0.0015	0.0035	0.0009	-0.0001
1.280	0.4830	0.5205	0.5052	0.5412	0.5136	0.5599	0.5379	0.0205	0.0411	0.0224	0.0360	-0.0008	0.0044	0.0010	-0.0000
1.580	0.5957	0.6349	0.6175	0.6567	0.6335	0.6899	0.6573	0.0205	0.0460	0.0210	0.0456	-0.0018	0.0068	-0.0008	-0.0018
1.880	0.7089	0.7488	0.7295	0.7711	0.7538	0.8054	0.7764	0.0205	0.0466	0.0224	0.0517	0.0008	0.0058	0.0010	-0.0000

Table 17. Cont

Parameter Varied	None	λ'	P_b'	λ'P_b'	S_r'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'	Effect of			Interaction of			
τ	W_1	W_7	W_8	W_{14}	W_9	W_{18}	W_{27}	W_{47}	λ'	P_b'	S_r'	λ'P_b'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'
0.005	0.0061	0.0084	0.0057	0.0093	0.0068	0.0094	0.0064	0.0141	0.0031	0.0003	0.0009	0.0007	0.0002	0.0000	0.0000
0.020	0.0142	0.0179	0.0123	0.0127	0.0155	0.0197	0.0134	0.0141	0.0023	-0.0037	0.0014	-0.0017	0.0002	-0.0001	-0.0000
0.050	0.0277	0.0337	0.0242	0.0164	0.0300	0.0367	0.0262	0.0141	-0.0008	-0.0108	0.0022	-0.0072	0.0001	-0.0004	-0.0003
0.110	0.0520	0.0614	0.0460	0.0220	0.0559	0.0665	0.0495	0.0141	-0.0074	-0.0236	0.0036	-0.0174	-0.0001	-0.0009	-0.0007
0.200	0.0864	0.0998	0.0775	0.0291	0.0925	0.1079	0.0829	0.0141	-0.0178	-0.0414	0.0055	-0.0322	-0.0003	-0.0016	-0.0013
0.380	0.1517	0.1723	0.1383	0.0411	0.1618	0.1857	0.1474	0.0141	-0.0390	-0.0751	0.0089	-0.0612	-0.0007	-0.0028	-0.0023
0.680	0.2596	0.2893	0.2410	0.0590	0.2763	0.3115	0.2562	0.0141	-0.0775	-0.1293	0.0146	-0.1100	-0.0014	-0.0049	-0.0041
0.980	0.3707	0.4054	0.3511	0.0762	0.3942	0.4362	0.3729	0.0141	-0.1225	-0.1813	0.0203	-0.1608	-0.0024	-0.0069	-0.0060
1.280	0.4830	0.5205	0.4645	0.0929	0.5136	0.5599	0.4934	0.0141	-0.1706	-0.2318	0.0262	-0.2125	-0.0035	-0.0087	-0.0079
1.580	0.5957	0.6349	0.5798	0.1094	0.6335	0.6899	0.6160	0.0141	-0.2186	-0.2831	0.0340	-0.2664	-0.0030	-0.0124	-0.0116
1.880	0.7089	0.7488	0.6961	0.1225	0.7538	0.8054	0.7398	0.0141	-0.2721	-0.3312	0.0391	-0.3178	-0.0052	-0.0117	-0.0111

Table 18. Vertical penetration of wetting front, main effect, and interactive effect at different dimensionless time steps, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$	Effect of			Interaction of			
τ	V_1	V_2	V_3	V_{12}	V_9	V_{16}	V_{25}	V_{43}	λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.4000	0.0500	0.0500	0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.4000	0.4000	0.3000	0.4000	0.4000	0.4000	0.0500	0.0500	0.0000	-0.0500	0.0000	0.0000	0.0000
0.050	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.110	0.6000	0.6000	0.7000	0.7000	0.7000	0.6000	0.7000	0.4000	-0.0250	0.0750	0.0250	0.0250	-0.0250	-0.0250	0.0250
0.200	0.8000	0.8000	0.9000	0.8000	0.8000	0.7000	0.8000	0.4000	-0.0500	0.0500	-0.0500	0.0000	0.0000	0.0000	0.0500
0.380	1.1000	0.9000	1.1000	1.0000	1.0000	0.9000	1.1000	0.4000	-0.1250	0.0750	-0.0250	0.0250	0.0250	0.0250	-0.0250
0.680	1.3000	1.2000	1.3000	1.3000	1.3000	1.1000	1.3000	0.4000	-0.0750	0.0750	-0.0250	0.0750	-0.0250	0.0250	0.0250
0.980	1.5000	1.3000	1.4000	1.5000	1.5000	1.3000	1.4000	0.4000	-0.0500	0.0500	0.0000	0.1500	0.0000	0.0000	0.0000
1.280	1.7000	1.5000	1.6000	1.6000	1.7000	1.5000	1.6000	0.4000	-0.0750	0.0250	0.0250	0.1250	0.0250	0.0250	0.0250
1.580	1.8000	1.6000	1.7000	1.8000	1.9000	1.6000	1.7000	0.4000	-0.0750	0.0250	0.0250	0.1750	-0.0250	-0.0250	0.0250
1.880	2.0000	1.7000	1.8000	2.0000	2.0000	1.8000	1.8000	0.4000	-0.0250	0.0250	0.0250	0.2250	0.0250	-0.0250	-0.0250

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$	Effect of			Interaction of			
τ	V_1	V_7	V_3	V_{13}	V_4	V_{17}	V_{24}	V_{44}	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.5000	0.0500	0.0500	0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.4000	0.5000	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.5000	0.6000	0.5000	0.5000	0.1000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.8000	0.7000	0.7000	0.7000	0.5000	0.0750	0.0750	0.0250	0.0250	-0.0250	-0.0250	0.0250
0.200	0.8000	0.9000	0.9000	0.9000	0.8000	0.9000	0.8000	0.5000	0.0750	0.0250	-0.0250	-0.0250	0.0250	-0.0250	0.0250
0.380	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.680	1.3000	1.3000	1.3000	1.3000	1.3000	1.3000	1.3000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	1.5000	1.5000	1.4000	0.5000	0.0000	-0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.6000	1.5000	1.7000	1.6000	1.5000	0.5000	-0.0750	-0.1250	-0.0250	0.0250	0.0250	-0.0250	0.0250
1.580	1.8000	1.7000	1.7000	1.6000	1.8000	1.7000	1.6000	0.5000	-0.0750	-0.1250	-0.0250	0.0250	0.0250	-0.0250	0.0250
1.880	2.0000	1.8000	1.8000	1.7000	1.9000	1.8000	1.7000	0.5000	-0.1250	-0.1750	-0.0750	0.0250	0.0250	-0.0250	-0.0250

Table 18. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda' P_b'$	S_r	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b S_r$	Effect of			Interaction of			
τ	V_1	V_7	V_8	V_{14}	V_4	V_{17}	V_{26}	V_{45}	λ'	P_b'	S_r	$\lambda' P_b'$	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b S_r$
0.005	0.2000	0.3000	0.2000	0.3000	0.2000	0.3000	0.2000	0.4000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.5000	0.6000	0.4000	0.5000	0.5000	0.6000	0.4000	0.4000	0.1000	-0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.7000	0.7000	0.6000	0.4000	0.0250	-0.0750	0.0250	-0.0250	-0.0250	-0.0250	0.0250
0.200	0.8000	0.9000	0.8000	0.7000	0.8000	0.9000	0.8000	0.4000	0.0000	-0.1000	-0.0000	-0.1000	0.0000	-0.0000	0.0000
0.380	1.1000	1.1000	1.1000	0.8000	1.1000	1.1000	1.1000	0.4000	-0.1500	-0.1500	-0.0000	-0.1500	0.0000	-0.0000	-0.0000
0.680	1.3000	1.3000	1.4000	1.0000	1.3000	1.3000	1.4000	0.4000	-0.2000	-0.1000	0.0000	-0.2000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.6000	1.1000	1.5000	1.5000	1.6000	0.4000	-0.2500	-0.1500	0.0000	-0.2500	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.9000	1.2000	1.7000	1.6000	1.8000	0.4000	-0.3750	-0.1250	-0.0250	-0.2750	0.0250	-0.0250	0.0250
1.580	1.8000	1.7000	2.0000	1.3000	1.8000	1.7000	2.0000	0.4000	-0.4000	-0.1000	0.0000	-0.3000	0.0000	0.0000	0.0000
1.880	2.0000	1.8000	2.0000	1.3000	1.9000	1.8000	2.0000	0.4000	-0.4250	-0.2250	-0.0250	-0.2750	0.0250	0.0250	-0.0250

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r'	$\lambda' S_r'$	$P_b S_r'$	$\lambda' P_b S_r'$	Effect of			Interaction of			
τ	V_1	V_7	V_3	V_{13}	V_9	V_{18}	V_{25}	V_{46}	λ'	P_b	S_r'	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r'$	$\lambda' P_b S_r'$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.5000	0.0500	0.0500	0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.4000	0.5000	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.5000	0.6000	0.5000	0.6000	0.5000	0.6000	0.5000	0.5000	0.1000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.7000	0.8000	0.7000	0.7000	0.7000	0.5000	0.0750	0.0750	0.0250	0.0250	-0.0250	-0.0250	0.0250
0.200	0.8000	0.9000	0.9000	0.9000	0.8000	0.9000	0.8000	0.5000	0.0750	0.0250	-0.0250	-0.0250	0.0250	-0.0250	0.0250
0.380	1.1000	1.1000	1.1000	1.1000	1.0000	1.1000	1.1000	0.5000	0.0250	0.0250	-0.0250	-0.0250	0.0250	0.0250	-0.0250
0.680	1.3000	1.3000	1.3000	1.3000	1.3000	1.3000	1.3000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.4000	1.4000	1.5000	1.5000	1.4000	0.5000	0.0000	-0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.6000	1.5000	1.7000	1.6000	1.6000	0.5000	-0.1000	-0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
1.580	1.8000	1.7000	1.7000	1.6000	1.9000	1.7000	1.7000	0.5000	-0.1250	-0.1250	0.0250	0.0250	-0.0250	-0.0250	0.0250
1.880	2.0000	1.8000	1.8000	1.7000	2.0000	1.8000	1.8000	0.5000	-0.1500	-0.1500	0.0000	0.0500	0.0000	0.0000	0.0000

Table 18. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda'P_b'$	S_r'	$\lambda'S_r'$	$P_b'S_r'$	$\lambda'P_b'S_r'$	Effect of			Interaction of			
τ	V_1	V_7	V_8	V_{14}	V_9	V_{18}	V_{27}	V_{47}	λ'	P_b'	S_r'	$\lambda'P_b'$	$\lambda'S_r'$	$P_b'S_r'$	$\lambda'P_b'S_r'$
0.005	0.2000	0.3000	0.2000	0.3000	0.2000	0.3000	0.2000	0.4000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.4000	0.3000	0.4000	0.3000	0.4000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.5000	0.6000	0.4000	0.5000	0.5000	0.6000	0.4000	0.4000	0.1000	-0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
0.110	0.6000	0.7000	0.6000	0.6000	0.7000	0.7000	0.6000	0.4000	0.0250	-0.0750	0.0250	-0.0250	-0.0250	-0.0250	0.0250
0.200	0.8000	0.9000	0.8000	0.7000	0.8000	0.9000	0.8000	0.4000	0.0000	-0.1000	-0.0000	-0.1000	0.0000	-0.0000	0.0000
0.380	1.1000	1.1000	1.1000	0.8000	1.0000	1.1000	1.1000	0.4000	-0.1250	-0.1250	-0.0250	-0.1750	0.0250	0.0250	-0.0250
0.680	1.3000	1.3000	1.4000	1.0000	1.3000	1.3000	1.4000	0.4000	-0.2000	-0.1000	0.0000	-0.2000	0.0000	0.0000	0.0000
0.980	1.5000	1.5000	1.6000	1.1000	1.5000	1.5000	1.6000	0.4000	-0.2500	-0.1500	0.0000	-0.2500	0.0000	0.0000	0.0000
1.280	1.7000	1.6000	1.9000	1.2000	1.7000	1.6000	1.9000	0.4000	-0.4000	-0.1000	0.0000	-0.3000	0.0000	0.0000	0.0000
1.580	1.8000	1.7000	2.0000	1.3000	1.9000	1.7000	2.0000	0.4000	-0.4250	-0.1250	0.0250	-0.2750	-0.0250	-0.0250	0.0250
1.880	2.0000	1.8000	2.0000	1.3000	2.0000	1.8000	2.0000	0.4000	-0.4500	-0.2500	0.0000	-0.2500	0.0000	0.0000	0.0000

Table 19. Horizontal movement of wetting front, main effect, and interactive effect at different dimensionless time steps, when three soil parameters varied simultaneously.

Parameter Varied	None	λ	P_b	λP_b	S_r'	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$	Effect of			Interaction of			
τ	H_1	H_2	H_3	H_{12}	H_9	H_{16}	H_{25}	H_{43}	λ	P_b	S_r'	λP_b	$\lambda S_r'$	$P_b S_r'$	$\lambda P_b S_r'$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.4000	0.0500	0.0500	-0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.3000	0.4000	0.4000	0.3000	0.3000	0.4000	0.4000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.4000	0.4000	0.5000	0.4000	0.4000	0.4000	0.5000	0.4000	-0.0500	0.0500	-0.0000	-0.0500	0.0000	0.0000	0.0000
0.110	0.5000	0.4000	0.6000	0.5000	0.5000	0.4000	0.6000	0.4000	-0.1000	0.1000	-0.0000	0.0000	0.0000	-0.0000	0.0000
0.200	0.6000	0.5000	0.7000	0.6000	0.6000	0.5000	0.7000	0.4000	-0.1000	0.1000	-0.0000	-0.0000	0.0000	0.0000	0.0000
0.380	0.8000	0.6000	0.9000	0.8000	0.8000	0.5000	0.9000	0.4000	-0.1750	0.1750	-0.0250	0.0750	-0.0250	0.0250	0.0250
0.680	1.0000	0.6000	1.2000	0.9000	0.9000	0.6000	1.1000	0.4000	-0.3000	0.2500	-0.0500	0.0500	0.0500	-0.0000	0.0000
0.980	1.1000	0.7000	1.4000	1.1000	1.1000	0.7000	1.3000	0.4000	-0.3500	0.3000	-0.0500	0.0500	-0.0000	-0.0500	0.0000
1.280	1.2000	0.8000	1.5000	1.2000	1.2000	0.8000	1.4000	0.4000	-0.3250	0.3250	-0.0250	0.0750	0.0250	-0.0250	0.0250
1.580	1.3000	0.9000	1.6000	1.3000	1.3000	0.8000	1.6000	0.4000	-0.3750	0.3750	-0.0250	0.0750	-0.0250	0.0250	0.0250
1.880	1.4000	0.9000	1.7000	1.4000	1.3000	0.9000	1.7000	0.4000	-0.4000	0.4000	-0.0500	0.0500	0.0000	0.0000	-0.0500

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$	Effect of			Interaction of			
τ	H_1	H_7	H_3	H_{13}	H_4	H_{17}	H_{24}	H_{44}	λ'	P_b	S_r	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r$	$\lambda' P_b S_r$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.5000	0.0500	0.0500	-0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.4000	0.5000	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.4000	0.5000	0.5000	0.6000	0.4000	0.5000	0.5000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	-0.0000	0.0000
0.110	0.5000	0.7000	0.6000	0.8000	0.5000	0.7000	0.6000	0.5000	0.2000	0.1000	-0.0000	-0.0000	0.0000	0.0000	0.0000
0.200	0.6000	0.8000	0.7000	1.0000	0.6000	0.8000	0.7000	0.5000	0.2500	0.1500	0.0000	0.0500	-0.0000	-0.0000	0.0000
0.380	0.8000	1.0000	0.9000	1.3000	0.8000	1.1000	1.0000	0.5000	0.3000	0.2000	0.0500	0.0500	0.0000	-0.0000	-0.0500
0.680	1.0000	1.3000	1.2000	1.6000	1.0000	1.3000	1.2000	0.5000	0.3500	0.2500	0.0000	0.0500	0.0000	0.0000	0.0000
0.980	1.1000	1.5000	1.4000	1.8000	1.1000	1.5000	1.4000	0.5000	0.4250	0.3250	0.0250	0.0250	0.0250	0.0250	0.0250
1.280	1.2000	1.6000	1.5000	2.0000	1.2000	1.7000	1.5000	0.5000	0.5000	0.3500	0.0500	0.0500	0.0500	0.0000	0.0000
1.580	1.3000	1.8000	1.6000	2.2000	1.3000	1.8000	1.6000	0.5000	0.5750	0.3750	0.0250	0.0750	0.0250	0.0250	0.0250
1.880	1.4000	1.9000	1.7000	2.3000	1.4000	2.0000	1.8000	0.5000	0.5750	0.3750	0.0750	0.0250	0.0250	0.0250	-0.0250

Table 19. Continued.

Parameter Varied	None	λ'	P_b'	$\lambda' P_b'$	S_r	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$							
									Effect of			Interaction of			
τ	H_1	H_7	H_8	H_{14}	H_4	H_{17}	H_{26}	H_{45}	λ'	P_b'	S_r	$\lambda' P_b'$	$\lambda' S_r$	$P_b' S_r$	$\lambda' P_b' S_r$
0.005	0.2000	0.3000	0.9000	0.2000	0.2000	0.3000	0.2000	0.3000	-0.1000	0.1500	-0.1500	-0.2000	0.2000	-0.1500	0.2000
0.020	0.3000	0.4000	1.0000	0.3000	0.3000	0.4000	0.3000	0.3000	-0.1250	0.1250	-0.1750	-0.2250	0.1750	-0.1750	0.1750
0.050	0.4000	0.5000	1.1000	0.4000	0.4000	0.5000	0.4000	0.3000	-0.1250	0.1250	-0.1750	-0.2250	0.1750	-0.1750	0.1750
0.110	0.5000	0.7000	-0.4000	0.4000	0.5000	0.7000	0.4000	0.3000	0.3250	-0.3750	0.2250	0.1250	-0.1750	0.2250	-0.1750
0.200	0.6000	0.8000	-0.4000	0.5000	0.6000	0.8000	0.5000	0.3000	0.3250	-0.4250	0.2250	0.1250	-0.2250	0.2250	-0.2250
0.380	0.8000	1.0000	-0.4000	0.6000	0.8000	1.1000	0.7000	0.3000	0.3750	-0.5250	0.3250	0.1250	-0.2250	0.2750	-0.2750
0.680	1.0000	1.3000	-0.4000	0.8000	1.0000	1.3000	0.8000	0.3000	0.4500	-0.6500	0.3000	0.1500	-0.3000	0.3000	-0.3000
0.980	1.1000	1.5000	-0.4000	0.9000	1.1000	1.5000	0.9000	0.3000	0.5250	-0.7250	0.3250	0.1250	-0.3250	0.3250	-0.3250
1.280	1.2000	1.6000	0.9000	1.0000	1.2000	1.7000	1.0000	0.3000	0.2500	-0.4500	0.0500	-0.2000	0.0000	-0.0000	-0.0500
1.580	1.3000	1.8000	1.0000	1.0000	1.3000	1.8000	1.1000	0.3000	0.2500	-0.5000	0.0500	-0.2500	0.0000	0.0500	0.0000
1.880	1.4000	1.9000	1.1000	1.1000	1.4000	2.0000	1.2000	0.3000	0.2500	-0.5500	0.0500	-0.3000	-0.0000	0.0000	-0.0500

Parameter Varied	None	λ'	P_b	$\lambda' P_b$	S_r'	$\lambda' S_r'$	$P_b S_r'$	$\lambda' P_b S_r'$							
									Effect of			Interaction of			
τ	H_1	H_7	H_3	H_{13}	H_9	H_{18}	H_{25}	H_{46}	λ'	P_b	S_r'	$\lambda' P_b$	$\lambda' S_r$	$P_b S_r'$	$\lambda' P_b S_r'$
0.005	0.2000	0.3000	0.3000	0.3000	0.2000	0.3000	0.3000	0.5000	0.0500	0.0500	-0.0000	-0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.4000	0.5000	0.3000	0.4000	0.4000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	0.0000	0.0000
0.050	0.4000	0.5000	0.5000	0.6000	0.4000	0.5000	0.5000	0.5000	0.1000	0.1000	-0.0000	0.0000	0.0000	-0.0000	0.0000
0.110	0.5000	0.7000	0.6000	0.8000	0.5000	0.6000	0.6000	0.5000	0.1750	0.1250	-0.0250	0.0250	-0.0250	0.0250	0.0250
0.200	0.6000	0.8000	0.7000	1.0000	0.6000	0.8000	0.7000	0.5000	0.2500	0.1500	0.0000	0.0500	-0.0000	-0.0000	0.0000
0.380	0.8000	1.0000	0.9000	1.3000	0.8000	1.0000	0.9000	0.5000	0.2750	0.1750	-0.0250	0.0750	-0.0250	-0.0250	-0.0250
0.680	1.0000	1.3000	1.2000	1.6000	0.9000	1.3000	1.1000	0.5000	0.3750	0.2250	-0.0750	0.0250	0.0250	-0.0250	-0.0250
0.980	1.1000	1.5000	1.4000	1.8000	1.1000	1.4000	1.3000	0.5000	0.4000	0.3000	-0.0500	0.0500	0.0000	-0.0000	0.0500
1.280	1.2000	1.6000	1.5000	2.0000	1.2000	1.6000	1.4000	0.5000	0.4750	0.3250	-0.0250	0.0750	0.0250	-0.0250	0.0250
1.580	1.3000	1.8000	1.6000	2.2000	1.3000	1.7000	1.6000	0.5000	0.5000	0.3500	-0.0500	0.0500	-0.0500	-0.0000	-0.0000
1.880	1.4000	1.9000	1.7000	2.3000	1.3000	1.8000	1.7000	0.5000	0.5500	0.4000	-0.0500	0.0500	0.0000	0.0500	0.0000

Table 19. Continued.

Parameter Varied	None	λ'	P_b'	λ'P_b'	S_r'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'	Effect of			Interaction of			
τ	H_1	H_7	H_8	H_{14}	H_9	H_{18}	H_{27}	H_{47}	λ'	P_b'	S_r'	λ'P_b'	λ'S_r'	P_b'S_r'	λ'P_b'S_r'
0.005	0.2000	0.3000	0.2000	0.2000	0.2000	0.3000	0.2000	0.3000	0.0500	−0.0500	0.0000	−0.0500	0.0000	0.0000	0.0000
0.020	0.3000	0.4000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000	0.0500	−0.0500	0.0000	−0.0500	0.0000	0.0000	0.0000
0.050	0.4000	0.5000	0.4000	0.4000	0.4000	0.5000	0.3000	0.3000	0.0750	−0.0750	−0.0250	−0.0250	0.0250	−0.0250	0.0250
0.110	0.5000	0.7000	0.4000	0.4000	0.5000	0.6000	0.4000	0.3000	0.0750	−0.1750	−0.0250	−0.0750	−0.0250	0.0250	0.0250
0.200	0.6000	0.8000	0.5000	0.5000	0.6000	0.8000	0.5000	0.3000	0.1000	−0.2000	0.0000	−0.1000	0.0000	0.0000	0.0000
0.380	0.8000	1.0000	0.6000	0.6000	0.8000	1.0000	0.6000	0.3000	0.1000	−0.3000	0.0000	−0.1000	0.0000	−0.0000	0.0000
0.680	1.0000	1.3000	0.8000	0.8000	0.9000	1.3000	0.8000	0.3000	0.1500	−0.3500	−0.0500	−0.2000	0.0000	0.0000	−0.0500
0.980	1.1000	1.5000	0.9000	0.9000	1.1000	1.4000	0.9000	0.3000	0.1500	−0.4000	−0.0500	−0.2000	−0.0500	−0.0000	−0.0000
1.280	1.2000	1.6000	0.2000	1.0000	1.2000	1.6000	1.0000	0.3000	0.3750	−0.6250	0.1750	−0.0250	−0.2250	0.1750	−0.2250
1.580	1.3000	1.8000	0.3000	1.0000	1.3000	1.7000	1.1000	0.3000	0.3750	−0.6750	0.1750	−0.0750	−0.2250	0.2250	−0.1750
1.880	1.4000	1.9000	0.4000	1.1000	1.3000	1.8000	1.2000	0.3000	0.4000	−0.6500	0.1500	−0.1000	−0.2000	0.2500	−0.2000