3-31-2009

Space Research Projects for the International Space Station

Kyle Hodgson
Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/gas_post

Part of the Physics Commons

Recommended Citation
SIDES
Space Italian Dressing
Experimental Setup
SIDES examines the dynamics of fluid segregation between fluids of differing densities. While in space the fluids will not undergo buoyant or convective forces, thus isolating the effects of separation due to density and molecular forces. The experiment will serve as an outreach experiment in addition to gleaning scientific data; mixtures are a topic of study in the 5th grade curriculum.

The experiment is a sealed container holding mineral oil, water, and gaseous nitrogen. As the two liquids do not mix well together, shaking will result in something similar to a bottle of salad dressing. When first shaken on Earth, the substances will form globules that do not mix with each other, but over time the two liquids will reach an equilibrium state that is identical to the starting state. The fluid interaction in space is unknown. The “salad dressing” will be taken to the ISS by a space flight participant who will do the shaking, re-shaking, and recording. Since there is no “up” in space, it will not be the case that the less dense fluid rises to the “top.” This data could be used to characterize the behavior of fluid interaction while in microgravity environments. This research would be the first of its kind and may lead to insights on how to store liquid fuel for future deep-space missions.

Acknowledgements
Troy Munro
Sarah Isert
Victoria Ragsdale
Dayne Howard
Space adventures
Russian Space Agency

Space Research Projects for the International Space Station
Kyle Hodgson, Undergraduate Researcher
JR Dennison, Faculty Mentor
Department of Physics, College of Physics

IPAS
International Paper Airplanes in Space

The objective of IPAS is to excite children about space research by giving them a chance to take part in it. IPAS includes collecting paper airplanes made by elementary-school students from around the world. The airplanes will be sent to the ISS to determine the effects of microgravity on paper airplane flight. The data will be recorded, collected, and then disseminated.

This outreach project will mainly target the 16 countries building the ISS: Russia, Canada, Japan, Brazil, the United States, and 11 member nations of the European Space Agency (Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.) The goal is to use the USU international students from those nations as ambassadors to their home countries. It will be their responsibility to contact the elementary schools near their homes, collect the airplanes, and return them to USU. The airplanes will then be sent to the ISS care of Space Adventures and the Russian Space Agency.

The final project will only include two airplanes from each participating country that will be sent to the ISS. The airplanes will be flown and recorded by a space participant. The video and space weathered planes will then be returned to the several countries.

Though not garnishing any scientific findings, IPAS includes collecting paper airplanes made by elementary-school students from around the world. The data could help determine if “granular gas” occurs in space. Granular gas is the solid state equivalent of the Leidenfrost effect. That is, just before reaching the convection stage there is a thin layer of granules that will “float” on the surface of a higher energy layer of granules.

Along with granular separation under microgravity conditions, analysis of the video could help determine if “granular gas” occurs in space. Granular gas is the solid state equivalent of the Leidenfrost effect.

By conducting this experiment in space it will be seen just how much inertia plays in granular separation and could lead to possible solutions for packaging and transporting materials that act like fluids.

Experimental Parameters
The experiment will include letter or A4-size paper, colored pencils, markers, etc. The students will be allowed to decorate their airplane however they would like. The only rule is the finished airplane cannot be glued; it must be only one piece of paper, and it must be able to fold flat.

Acknowledgements
Troy Munro
Sarah Isert
Victoria Ragsdale
Dayne Howard
Space adventures
Russian Space Agency

REMBRANT
Research on the Effects of Microgravity on the BRAzil NUT problem

Along with granular separation under microgravity conditions, analysis of the video could help determine if “granular gas” occurs in space. Granular gas is the solid state equivalent of the Leidenfrost effect.