

2003 – 2004 Oregon State University Microgravity Flight Team
Magnetic Mixing of Multiple Density Fluids In Microgravity (M3DFM)

Abstract

The 2004 Oregon State University Microgravity Flight Team (OSUMFT) is proposing a study of the mixing and the resultant concentration fields of miscible fluids under laser fluorescence coupled with image analysis. The Magnetic Mixing of Multiple Density Fluids in Microgravity (M3DFM) experiment will investigate several concentration fields of two fluids experiencing mixing with the aid of magnetic stirring mechanisms. Fluid mixing in both micro and standard gravitational conditions will be recorded with a high speed digital video camera.

The data will then be analyzed to determine the Degree of Mixing (DoM) of substances with varying viscosity and density using MATLAB® image processing software. Large concentration gradients, which are time varying during mixing, are expected to be highly dependent on the gravitational field if significant density differences exist between miscible fluids. These gradients cause buoyancy driven convection that ultimately affect overall mixing, and the associated time scales for mixing. The goal of this study is to assess the impact of the inherent concentration variations on overall mixing with and without gravitational effect.

The OSUMFT will also complete an extensive outreach program focused on interesting young people in science, mathematics, and space. In addition to our established program mentoring high school students constructing accelerometers to be tested on the KC-135, we have developed several new partnerships with existing outreach programs. The team will also present the results of our completed experiment to academic and professional communities.

The 2004 experiment designator is “discipulus coepi sollertia” (lat., student initiated ingenuity) since it is the first OSU reduced gravity project to be conceived in its entirety by the undergraduate team members. Previous OSU teams have sought experiment suggestions from professors.

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Discipulus Coepi Sollertia
Student Initiated Ingenuity
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