Paper ID: 18298
oral

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

Author: Dr. Gary Ruff
NASA Glenn Research Center, United States, gary.a.ruff@nasa.gov

LARGE SCALE SPACECRAFT FIRE SAFETY EXPERIMENTS

Abstract

The Spacecraft Fire Safety Demonstration project has been established by the National Aeronautics and Space Administration Advanced Exploration Systems Program under the Human Exploration and Operations Mission Directorate with the goal of conducting experiments that substantially advance our understanding of spacecraft fires. The objective of this project is to reduce the uncertainty and risk in the design of spacecraft fire safety systems by conducting flame spread and material flammability tests at nearly full scale for exploration spacecraft in long duration low-gravity. Future crewed missions are expected to be longer in duration than previous exploration missions because they will be conducted outside of low-earth orbit and could make use of cabin oxygen concentrations higher than 21%. This will increase the challenge of ensuring a fire-safe environment for the crew throughout the mission. The experiments under development are to be conducted in the Orbital Science Corporation Cygnus vehicle after it has been deberthed from the International Space Station. The tests will be fully automated with the data downlinked at the conclusion of the test before the Cygnus vehicle reenters the atmosphere. A computer modeling effort will complement the experimental effort. Associated with the project is an international topical team of fire experts who are conducting research that is integrated into the overall experiment design and post-flight analysis. This paper discusses the status of the large-scale spacecraft fire safety demonstration project. The status of the overall experiment development and the associated international technology development efforts are also summarized herein.