

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Sciences onboard the International Space Station and Beyond (6)

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THE CONTROL OF INSPECTOR SATELLITES VIA RELAY SATELLITES

Abstract

There are various robotic On-Orbit Servicing concepts existing, which aim at utilizing inspector satellites for obtaining high-fidelity video feedback from the remote environment. Most of these inspection tasks, which involve proximity operations, can be done autonomously by the spacecraft. However, there are cases such as sensor malfunctions or undefined spacecraft states, in which it seems advantageous to have the possibility of human interaction with the inspector satellite. An operator on ground with the capability of real-time control can complement autonomous operations and add robustness to mission operations. The SPHERES Interact program at the MIT Space Systems Laboratory currently develops concepts for efficient human spacecraft interaction. Using three experimental satellites aboard the International Space Station, a series of test were executed, which evaluated different approaches and methods. Additionally, using another three of these experimental satellites on the air bearing table at the Space Systems Laboratory, advanced concepts can already be developed and verified on ground. This paper shows experiments, in which the SPHERES at MIT were controlled via a geostationary relay satellite of the European Space Agency (ESA) using a ground station in Germany. It emphasizes the benefits of real-time human spacecraft interaction and describes the design of the according test environment.