

# **A FLIGHT DEMONSTRATION CONCEPT FOR FLUID RESUPPLY SYSTEM**

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## **ABSTRACT**

During the past decade, both NASA and the Department of Defense have sponsored numerous satellite maintenance and servicing studies and programs. These studies have ranged from the feasibility and benefits derived from on-orbit refueling to detailed systems design, such as fluid transfer couplings, etc. These studies concluded that on-orbit fluid resupply was feasible ,and would allow space vehicles to be utilized more effectively.

In this paper a preliminary concept for fluid resupply system and the operations requirements to implement a full scale on-orbit flight demonstration will be presented. The flight demonstration envisioned would include automatic rendezvous, docking and fluid transfer utilizing a fluid servicer and a target vehicle.

The presentation will discuss a flight demonstration study that was conducted in two phases. The first phase investigated key technologies required and the level of technology maturity for the demonstration. It identified and compared the available target and launch vehicles to derive a recommended launch vehicle. Phase one also involved developing the initial set of requirements for the servicer vehicle and the mission operations concept. Phase two involved designing the servicer, developing the mission scenarios, and verifying the concepts by performing full scale engineering simulations.

Finally a recommended concept for a flight demonstration to validate the design will be presented. The design will include detailed requirements for the servicer fluid subsystem, (i.e. propellant types, storage, **pressurant**, interface and manifold, etc.) target adapter kit fluid subsystem, servicer propulsion subsystem, servicer electrical power subsystem, servicer command and data handling subsystem, servicer communication subsystem, guidance navigation and control , and sensor subsystem.

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