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Simulated Propellant Loading System: Testbed for Cryogenic Component and Control Systems Research & Development

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Technologies in the fields of cryogenic components and control systems is constantly evolving to advance the state of current cryogenic operations that will support future space exploration missions. To meet new demanding requirements, these missions will increasingly rely upon research and development in energy-efficient storage, transfer and use of cryogens and cryogenic propellants on Earth and in space. The capability to test these technologies is sometimes limited to isolated subsystems with a narrow application spectrum. The motivation for the Simulated Propellant Loading System (SPLS) is to provide an integrated multipurpose generic testbed to allow dedicated test and evaluation of new technologies in a field environment on a scale that is relevant to launch facility propellant systems. The Cryogenic Test Laboratory (CTL) at the Kennedy Space Center has more than two years of operational experience of using the SPLS to support independent and integrated technology maturation. This paper presents the development of a highly repeatable automated cold flow test sequence that was used in the evaluation and advancement of autonomous control system technologies. A range of other recent applications and capabilities of the SPLS will also be presented.

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