NASA Ares I Launch Vehicle Upper Stage Reaction Control System (ReCS) Cold Flow Development Test Overview

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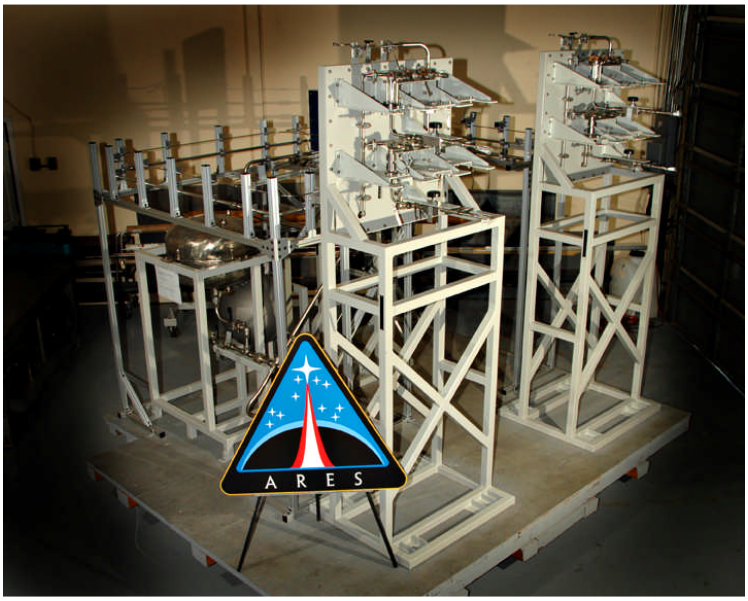
NASA's Ares I launch vehicle, consisting of a five segment solid rocket booster first stage and a liquid bi-propellant J2-X engine Upper Stage, is the vehicle that's been chosen to launch the Orion Crew Module, which will return humans to the Moon, Mars, and beyond. After First Stage booster separation, the Reaction Control System (ReCS), a monopropellant hydrazine system, will provide the Upper Stage element with three degrees of freedom control as needed. This paper provides an overview of the system level development testing that has taken place on the Ares I launch vehicle Upper Stage ReCS. The ReCS System Development Test Article (SDTA) was built as a flight representative water flow test article whose primary test objective was to obtain fluid system performance data to evaluate the integrate system performance characteristics and verify analytical models. Water is the industry standard for cold flow testing of hydrazine systems, because the densities are very close and the speeds of sound are well characterized. The completion of this development level test program was considered necessary to support the ReCS Critical Design Review. This paper will address the design approach taken in building the test article, the objectives of the test program, types of testing completed, general results, the ability of the program to meet the test objectives, and lessons learned.



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