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THE ORION-ESM PROPULSION SYSTEM: STATUS AND OUTLOOK

Abstract

The Orion Multi-Purpose Crew Vehicle (MPCV) is the next generation spacecraft that NASA currently develops to send humans and cargo to the moon and beyond and return them back to earth safely. The vehicle, which will be launched by the new Space Launch System (SLS), is designed to support long-duration deep space missions. The first exploration mission is planned to take place end of 2019 as an un-crewed lunar fly-by mission followed by a second exploration mission in 2021 taking astronauts to the moon. The MPCV resembles its Apollo predecessors and will consist of a habitable Crew Module (CM) and a disposable European Service Module (ESM) that provides power, life support, and in-space propulsion. The ESM is subcontracted to ESA with Airbus DS GmbH as industrial partner being responsible for its development. This paper focuses on the actual status of the Orion ESM program after the shipment of the first flight model to the Kennedy Space Center in Florida, USA with a special view on the Propulsion Subsystem. This focus on the Propulsion Subsystem includes the verification activities on the Propulsion Qualification Model in the NASA White Sands Test Facility and the qualification activities on Equipment and Subassembly level. The second part of this paper gives an outlook on the ongoing tasks related to the design upgrade of the Propulsion Subsystem to the Mk II version. The configuration changes are foreseen to be implemented partially on Orion ESM FM-3 and partially FM-4. The main changes are related to the Propulsion Feed System and the Thrust Vector Control System.