

IAF SPACE PROPULSION SYMPOSIUM (C4)
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HYDRAULIC MODEL 3 TEST CAMPAIGN FOR VERIFICATION OF THE BANG-BANG
PRESSURIZATION SYSTEM OF THE ORION EUROPEAN SERVICE MODULE**Abstract**

The ORION spacecraft is a multi-purpose crew vehicle designed to support missions beyond low Earth orbit. ORION will be launched by the Space Launch System (SLS). NASA, ESA, European and US Industry are working together to develop the ORION spacecraft. ESA is responsible for the European Service Module (ESM) and awarded a contract to Airbus DS GmbH for its development and qualification as well as the production of two flight units. The European Service Module provides translational thrust and 3 axis attitude control for the spacecraft, stores life support consumables for the crew module (oxygen, nitrogen and water), and provides thermal control and power. The Propulsion Subsystem (PSS) uses an Electrical Pressure Regulation System, a so-called bang-bang regulation system. The Electrical Pressure Regulation System consists of fast reaction high pressure gas valves. The performance requirements linked to the pressure regulation are very demanding in terms of pressure levels, mass flow rates and temperature domains. Such a dedicated test article was prepared, the so-called Hydraulic Model 3, HM-3, in order to complete the qualification of the pressurization system for the Orion ESM PSS. The test campaign will be performed on the DLR Lampoldshausen test bench P2. This paper presents the configuration of the HM-3, the main results of the test campaign as well as the associated modeling for test prediction and test evaluation. Also this paper gives an outlook in optimization studies linked to the pressurization system.