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LIQUID UPPER STAGE DEMONSTRATOR ENGINE (LUMEN): STATUS OF THE PROJECT

Abstract

With the LUMEN (Liquid upper stage demonstrator engine) project, DLR is aiming to develop, built and operate a breadboard engine based on an expander bleed cycle scheme. The propellants for LUMEN will be liquid oxygen (LOX) and liquid methane or more specifically liquid natural gas (LNG). LUMEN will be a modular breadboard engine to be used on DLR test benches such as the P8.3 test facility. The modular approach will make it easy to take the engine of the test bench, exchange components and go testing again. This way the demonstrator will provide a test bed for future component development-. The cycle will feature two turbopumps in order to simplify the turbopump design, while on the same time allowing more freedom for an exchange of components. By this approach the DLR will create a test bed for component research on engine level , open to any industrial or institutional partner. In this paper we will give an overview on the current development status of LUMEN. The preliminary design phase (PDR) is finished and the detailed design has started. We will show the current design of major components such as injector head, combustor, turbopumps and peripherals. First test campaigns have successfully been performed with the injector head and the combustor. The turbopumps are currently in production. Finally we will give an outline of the roadmap of future LUMEN test campaigns and activities.