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CURRENT STATUS OF THE LUMEN LOX/LNG ROCKET ENGINE DEMONSTRATOR

Abstract

The DLR project LUMEN (liquid upper stage demonstrator engine) aims at developing and operating a modular LOX/LNG bread-board engine in the 25 kN class for operation at the new P8.3 test facility at the DLR site of Lampoldshausen. This demonstrator project includes several technologies developed or matured at DLR's Institute of Space Propulsion like the API injector or laser plasma ignition. Its main goals are to improve the level of engine system competence within DLR by linking of the existing competence on component level as well as the creation of a modular test bed for investigation of new component technologies and engine cycle layouts. This article discusses the background of the LUMEN project, its scientific goals and the means to achieve them. The planned bread-board engine is described and the reasoning behind propellant selection, choice of the expander-bleed scheme as the engine cycle layout and selection of technologies for key engine components is explained. The project logic, project timeline as well as recent advances and milestones are illustrated. A special focus is placed on recent test activities covering LOX/LNG injection and ignition, combustion stability assessment and hot gas side heat transfer.