

IAF SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (2) (5)

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TECHNOLOGICAL ADVANCEMENTS IN THE HYPROB PROJECT - DEMONSTRATORS
DEVELOPMENT LINE**Abstract**

The activities, described in the present paper, have been conducted in the framework of the HYPROB Program, carried out by the Italian Aerospace Research Centre (CIRA) under contract by the Italian Ministry of Research (MIUR). The Program has the main objective to enable and improve National system and technology capabilities in the field of liquid rocket engines (LRE) for future Space Propulsion Systems and applications, with specific regard to LOX/LCH₄ technology. Moreover, the Program is in coherence with the long-term vision, provided by the Italian Space Agency (ASI) on Space Propulsion. According to the last implementation of the program, a system line, named "HYPROB-DEMONSTRATORS", has been included: it aims at designing, manufacturing and testing LRE demonstrators, LRE and HRE breadboards. The main objective of this line is to design, manufacture and test a regeneratively cooled LOX/LCH₄ demonstrator, a pressure-fed thrust chamber assembly (TCA), aiming at validating critical design and technology features and then assessing the technology readiness level of potential solutions for future engines. The present paper illustrates the advancements in the technological activities in the development line. The activities, related to the development of the HYPROB LOX/LCH₄ Demonstrator are described and the current status discussed. Recently relevant advancements have been achieved on the Injector Head manufacturing and testing. In fact, after the ordinary acceptance and functional tests, HYPROB IH was mounted on a dummy chamber, developed by AVIO, and a successful firing test campaign was accomplished. On the path of consolidating the technological aspects for the final demonstrator manufacturing, a 1:1 scale mock-up has been manufactured by means of electro-plating technology and passed leak and proof tests. In order to furtherly deepen the comprehension of high pressure combustion issues and heat load distribution inside a LOX/LCH₄ thrust chamber, a calorimetric breadboard (SSBB) has been designed and actually is in manufacturing phase. Thus, the development status of both SSBB and final demonstrator is presented and main results discussed.