

SPACE PROPULSION SYMPOSIUM (C4)  
Propulsion Technology (1) (3)

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## NEW ACHIEVEMENTS IN THE HYPROB-BREAD LOX/LCH4 DEMONSTRATOR DEVELOPMENT

**Abstract**

The Italian Aerospace Research Center (CIRA) leads the HYPROB Program, promoted and funded by the Italian Ministry of University and Research (MIUR) in order to improve the National background on rocket engine systems for future space applications. A particular attention is paid on LOX/LCH4 propulsion technology in coherence with the long-term vision of the Italian Space Agency on Space Propulsion (ASI). The mid-term objective is to design, manufacture and test a regenerative LOX/LCH4 LRE demonstrator, with the main scope of validating critical design and technology features and then to assess technology readiness level of potential solutions for future engines. The design approach has been defined in order to proceed step by step, by means of simpler technological breadboards, allowing to address and verify the main critical design issues. So far some intermediate technological breadboards have already been developed, manufactured and tested, in particular the Methane Thermal Properties (MTP) breadboard, the GOx-GCH4 igniter and the sub-scale single-injector combustion (SSBB) breadboard. A parallel numerical rebuilding activity has been performed in order to consolidate the models, adopted to consolidate the final demonstrator design. At the moment, the demonstrator is in the manufacturing phase and some hardware, like injectors and injector head, has been produced and will be tested by the end of 2016. The present paper reports recent results from technological breadboards test activities and numerical rebuilding, conducted at the Italian Aerospace Research Center in the framework of the HYPROB Program System Line, named HYPROB-BREAD.