IAF SPACE PROPULSION SYMPOSIUM (C4)
Solid and Hybrid Propulsion (1) (3)

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STUDENT ACTIVITIES IN MANUFACTURING AND LAUNCHING ADVANCED SMALL-SCALE SOLID-PROPELLANT ROCKETS

Abstract

As a new space race is upon us, special attention is to be given to continuous development of launchers and their enabling technologies, which requires the training of highly qualified technical-scientific personnel. In this context, the development and design of model rockets and related hands-on activities can be considered an exceptional teaching tool, practical and concrete, for the training of young engineers and researchers in space projects.

In this context, following the experimental activities carried out in collaboration with the Italian Space Agency during last year ("Student firing tests and launches with commercial and self-made solid rocket motors", Dubai, UAE, 2021), students at the Department of Mechanical and Aerospace Engineering of Sapienza University of Rome are developing upgraded and more advanced versions of their rockets. The

activities are part of a multidisciplinary project aimed at the design, test, build, and launch of model rockets to be used as technological demonstrators and for educational purposes.

Students activities include building of electronic components, rocket design, manufacturing of rocket parts, rocket launches, and post-flight analysis. The rockets will include the following advancements: (i) 3D-printed components (e.g. fins, body tube, nosecone, video-camera housing); (ii) two-stage rocket models; (iii) advanced electronics able to separate the stages and ignite motors by command and to transmit data during the flight. Several rocket launches of increasing complexity up to 1 km are planned during this Spring and Summer semesters, and will be described and discussed in detail in the final paper.