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INTEGRATED APPROACH FOR HYBRID ROCKET TECHNOLOGY DEVELOPMENT AND  
ANALYSIS OF POSSIBLE APPLICATIONS

**Abstract**

Hybrid rocket motors tend generally to be simple from a mechanical point of view but difficult to optimize because of their complex and still not well understood cross-coupled physics. This paper addresses the previous issue presenting the integrated approach established at University of Padua to develop hybrid rocket based systems. The methodology tightly combines together system analysis and design, numerical modeling from elementary to sophisticated CFD, and experimental testing done with incremental philosophy. As an example of the approach, the paper presents the experience done in the development of a hybrid rocket booster designed for rocket assisted take off operations. Finally, the paper presents several system analyses done at University of Padua to evaluate possible hybrid rocket applications intended to exploit the major advantages of hybrid rocket motors as safety, simplicity, low cost and reliability.