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MODELLING OF A SUPERSONIC ROCKET USING ARCHITECTURE ANALYSIS LANGUAGE

Abstract

Created in 2005, the PERSEUS project (Student Project for European Space Research and Science by University) aims to carry out a nano satellite launch vehicle using innovative technology solutions from high school students. The macro project ARES (Advanced Rocket for Experimental Studies) was created in order to improve the solutions proposed by students on small demonstrators, reaching altitudes of several kilometers. ARES demonstrators are built using modules developed by several students associations, which constitute a common tools library improved each year. PERSEUS project has reached a significant stage last year with the first European flight of an hybrid engine with thrust modulation, Ares01H Amidala (for further details, see F.Laurendeau publication, at IAC, Cap Town, 2011). The next big step is the realization of a supersonic ARES demonstrator. As a participant of ARES macro-project, ISAE-Supaero supervises a study which aims to specify the corresponding needs to supersonic demonstrator, using systems engineering process and optimization methods, leading to a detailed description of what should be the technical solution. The main particularity of this study is to use Architecture Analysis and Design Language (AADL) to model and validate the whole rocket. This informatics language has been used, until now, only for embedded computer architectures in order to ensure that software implemented on some vehicles is to meet mission's requirements. This project is the first one using AADL to model a whole vehicle, including mechanics and avionics. Thereby, it will bring to the AADL community new patterns to open new horizons for the use of this architecture analysis language.