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OVERVIEW ON LIQUID PROPULSION SYSTEM MODELING TOOLS FOR QUICK-LOOP, ENGINEERING AND DESIGN STUDIES

Abstract

For the analysis of liquid propulsion systems reliable numerical tools for first sizing loops within advanced project concept studies, for design iterations within development phase and for flight performance predictions within production phase are required in order to ensure that early design decisions are based on sound and reliable results and in order to identify very early deviations w.r.t. nominal functional behaviour during the exploitation.

During past launcher system studies it was found that different needs exist w.r.t. modeling tools within the different program phases. Therefore dedicated tools were developed at Astrium Space Transportation for concept studies, development programs and exploitation programs.

This paper summarizes the actual status of available functional models split into the three main categories at Astrium Space Transportation. Further the validation status of the various tools is presented as well as different examples for latest applications. As complement the in-house strategies w.r.t. model configuration management and data storage management is shown.

Finally an outlook is given in the paper on the future modeling roadmap within Astrium Space Transportation.

It is concluded that the available functional software tools as well as the currently ongoing modeling activities will enable Astrium Space Transportation to support upcoming liquid propulsion system concept studies and development programs like A5ME, MPCV and A6.

The content of this paper is new and was hence not presented at previous conferences. Also the attendance of the author in Peking, China to deliver the paper is assured.