

Verification of Space System Dynamics Using the MATLAB Identification Toolbox in Space Qualification Test

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Abstract : This article presents a new approach to the Functional Testing of Space Systems (SS). It can be considered as a generic test and used for a wide class of SS that from the point of view of System Dynamics and Control may be described by the ordinary differential equations. Suggested methodology is based on using semi-natural experiment- laboratory stand that doesn't require complicated, precise and expensive technological control-verification equipment. However, it allows for testing system as a whole totally assembled unit during Assembling, Integration and Testing (AIT) activities, involving system hardware (HW) and software (SW). The test physically activates system input (sensors) and output (actuators) and requires recording their outputs in real time. The data is then inserted in laboratory PC where it is post-experiment processed by Matlab/Simulink Identification Toolbox. It allows for estimating system dynamics in form of estimation of system differential equations by the experimental way and comparing them with expected mathematical model prematurely verified by mathematical simulation during the design process.

Keywords : system dynamics, space system ground tests and space qualification, system dynamics identification, satellite attitude control, assembling, integration and testing

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