

Using Automation to Improve the Flight Software Testing Process

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ABSTRACT

One of the critical phases in the development of a spacecraft attitude control system (ACS) is the testing of its flight software. The testing (and test verification) of ACS flight software requires a mix of skills involving software, attitude control, data manipulation, and analysis. The process of analyzing and verifying flight software test results often creates a bottleneck which dictates the speed at which flight software verification can be conducted. In the development of the Microwave Anisotropy Probe (MAP) spacecraft ACS subsystem, an integrated design environment was used that included a MAP high fidelity (HiFi) simulation, a central database of spacecraft parameters, a script language for numeric and string processing, and plotting capability. In this integrated environment, it was possible to automate many of the steps involved in flight software testing, making the entire process more efficient and thorough than on previous missions. In this paper, we will compare the testing process used on MAP to that used on previous missions. The software tools that were developed to automate testing and test verification will be discussed, including the ability to import and process test data, synchronize test data and automatically generate HiFi script files used for test verification, and an automated capability for generating comparison plots. A summary of the perceived benefits of applying these test methods on MAP will be given. Finally, the paper will conclude with a discussion of re-use of the tools and techniques presented, and the ongoing effort to apply them to flight software testing of the Triana spacecraft ACS subsystem.

Outline

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 - B. Old vs New (XTE vs MAP) (Maureen Bartholomew)
- III. Integrated Design Environment (Jim O'Donnell)
 - A. Paramater Database
 - B. Scripting Language w/String Processing
 - C. Configured HiFi Simulation
 - D. Plotting Capability
- IV. Tool Descriptions (Jim O'Donnell)
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 - C. Plotting and Test Verification
- V. Reusability
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