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From Parts to Systems : Contribution of Tests on Performance Prediction and Assessment (1)

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SOFTWARE- IN –THE LOOP BASED END TO END VALIDATION METHODOLOGY FOR
AEROSPACE SOFTWARE DEVELOPMENT

Abstract

ISRO Satellite Centre (ISAC) is the lead centre of the Indian Space Research Organisation in the development and operationalisation of satellites for communication , navigation and remote sensing applications. In all these spacecrafts , highly advanced embedded systems carryout variety of mission critical functions . A typical example of such a system is the satellite Attitude and Orbit Control System –the on board computer which is the brain of the satellite. As per existing practices, testing of on board software to confirm its functioning in a simulated dynamic environment takes place only when the software is integrated with OBC hardware and system level tests in closed loop mode are conducted. On the contrary,by the new technique called the Software In Loop Simulation (SILS) test method , the on-board software can be fully tested in a software simulated dynamic environment without OBC hardware .

This method of closed loop flight software validation is demonstrated with CARTOSAT-2 AOCS software using SILS test bed. The results very well demonstrate the effectiveness of the technique in early performance prediction and assessment of flight software . This validation philosophy will be followed for future spacecraft GNC systems.

In a development environments where software requirements are too complex and requirements changes are to be incorporated even during final stages of development, this technique offers an excellent solution in fully validating on board software at source code level before it gets integrated with target hardware. This additional validation step not only improves software quality but also enhances productivity and reduces system turnaround time.