

IAF SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

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ATENA: AN ADVANCED SOLUTION FOR THE SIMULATION AND VALIDATION OF
NANOSATELLITE OPERATIONS

Abstract

One of the most complex activities during the development of a satellite is the testing of its system functional and logical behavior. However, each satellite has peculiar mission objectives and consequently requires design of specific test benches. A flexible test rig, adaptable to different mission scenarios, would be a tremendous advantage especially for nanosatellites, because of their low cost and their re-use design logic. In response to this need, Argotec has developed the Advanced Testing Emulator for Nanosatellites on Arm (ATENA), a flexible solution composed of both software and hardware. During the design phase, all the satellite functionalities and operations can be virtually reproduced by an in-house software (S-OWL) able to simulate the complete space mission in a 3D virtual environment, accounting for the nanosatellite dynamics. This capability can drastically speed-up and simplify the implementation and the preliminary check of the whole system functional logic, taking advantage of the physiological time lapse required for hardware provision. On the other hand, during the integration and testing phases, when the hardware is partially or totally available, all the satellite subsystems can be integrated on ATENA performing a hardware-in-the-loop simulation and verifying all of the connections and interactions at a system level. In addition, the satellite dynamics could be reproduced by means of specific actuation systems, such as a robotic arm, able to reproduce attitude changes, tracking, rendezvous, and other various operations that may occur during the satellite entire life. The aim of this work is to present ATENA main features, its impact on nanosatellite functional testing and the step forward that such a system represents for the future of the space exploration missions.