Generic AOCS Unit Simulation Models

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ESA are currently funding a study aimed at prototyping several AOCS sensor and actuator models to be used for AOCS performance analysis and validation on a range of test environments, including Avionics test benches. The development of such models offers the potential for reductions in effort through the reuse of validated unit models throughout the design, verification and validation lifecycle, and across the European AOCS community.

A consortium, led by Tessella, including Thales Alenia Space, EADS Astrium, and unit suppliers, is working together to develop these generic models for specified units. Development guidelines have been specified in order to ensure the models meet the needs of the AOCS community.

Currently, the project is in the final stages of the model coding and verification phase, in which detailed specifications are implemented, whilst adhering to guidelines to ensure the models will be:

- Usable on the full range of simulators and benches used in AOCS design, verification and validation from Matlab/Simulink simulations through to real time test benches.
- Applicable across different missions and therefore to different unit manufacturers, but able to be tuned to represent the performance of specific unit examples.
- Able to be used across the community of AOCS providers in Europe.

The guidelines consider issues such as functional scope and architecture of model development, model fidelity, interfaces, implementation environment and model verification and validation. During the development of the guidelines, in order to capture the views from the wider AOCS community outside of the core team, a round table event was held at ESTEC.

Models have now been coded and verified for generic models for three units (star tracker, gyro and reaction wheel). The models will then be tuned using data from unit suppliers and then validated as follows:

- For representative performance of real hardware for two unit examples.
- For operation on real time test bench environments.

The presentation summarises the activities to date and plans for the model validation. The resultant validated models will be made available to the AOCS community in Europe and will be a valuable resource in the future in supporting AOCS design and verification & validation activities.