

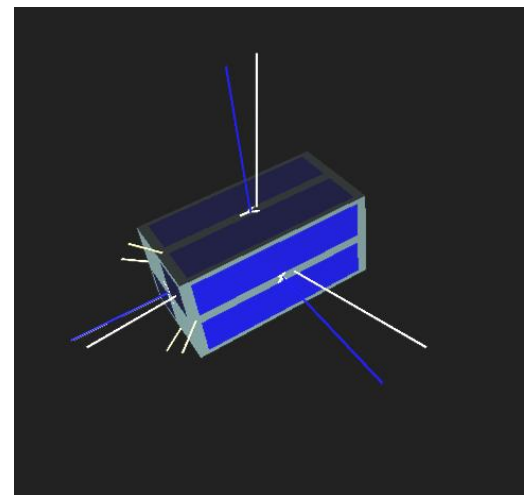
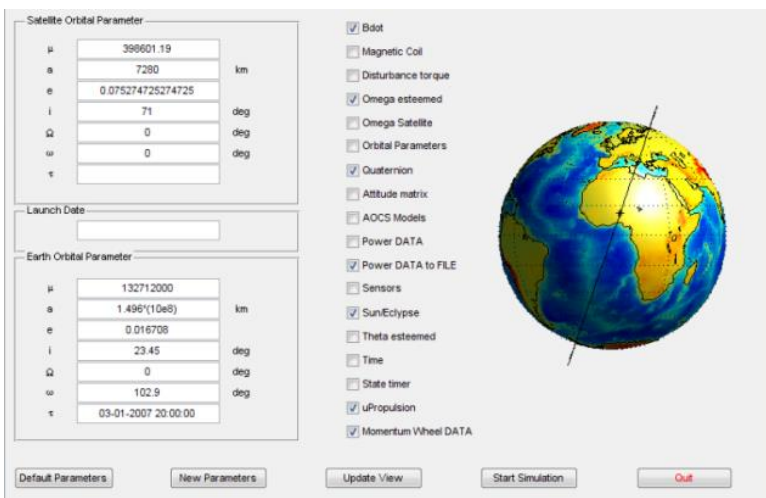
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ALMASIM

ALMASim is a mission simulation software based on MATLAB/Simulink language. The tool is used to simulate the operative condition of the satellite for attitude and orbit determination and control purposes, the simulation framework includes a 4th order Runge-Kutta numerical integrator to propagate the orbital motion of the satellite.

An environmental library has been introduced to simulate the orbital perturbation acting on the satellite. This library includes: aerodynamic drag, solar pressure radiation as disturbance both in attitude and orbital motion. Also gravity gradient torque and magnetic interaction has been introduced as perturbation in terms of attitude stabilization.

The JGM-3 gravity field perturbation model up to degree and order 70th has been included ad orbital propagation perturbations. Two main reference system are considered: an Earth centered True-of-Date (TOD) and a spacecraft body-fixed aligned to the spacecraft geometric axis.



The output of the simulation tool is selectable and it depends on the analysis requested.

Technical Information

Models implemented in ALMASim simulator:

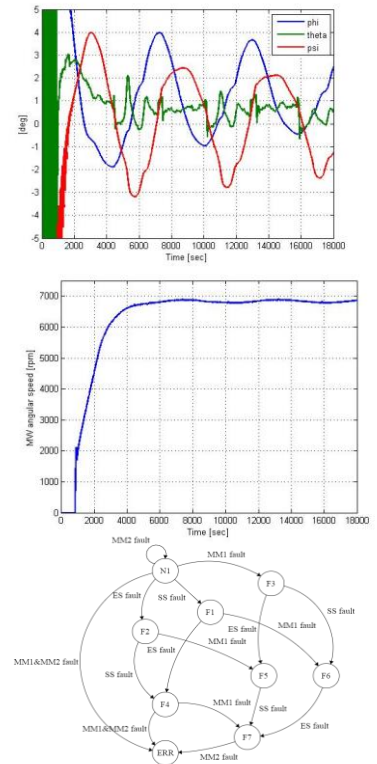
- Orbit propagation tool
- Numerical model of attitude sensors
- Inertial models of Sun direction, Earth direction and IGRF
- Attitude Determination and Angular velocity estimator algorithms

Post-Processing:

- Spacecraft attitude and maneuvers
- Orbital maneuvers evaluation
- AOCS model test and integration
- Monte Carlo analysis on attitude performances
- Spacecraft mission simulation

The tool shall be used to support other development discipline:

- Mission analysis support (satellite agility, satellite visibility, time of revisit, etc.)
- Power system support (illumination of solar array, sun direction evaluation and power generation)
- Software Verification and Validation support (AOCS algorithms validation, Hardware-In-the-Loop simulation)



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