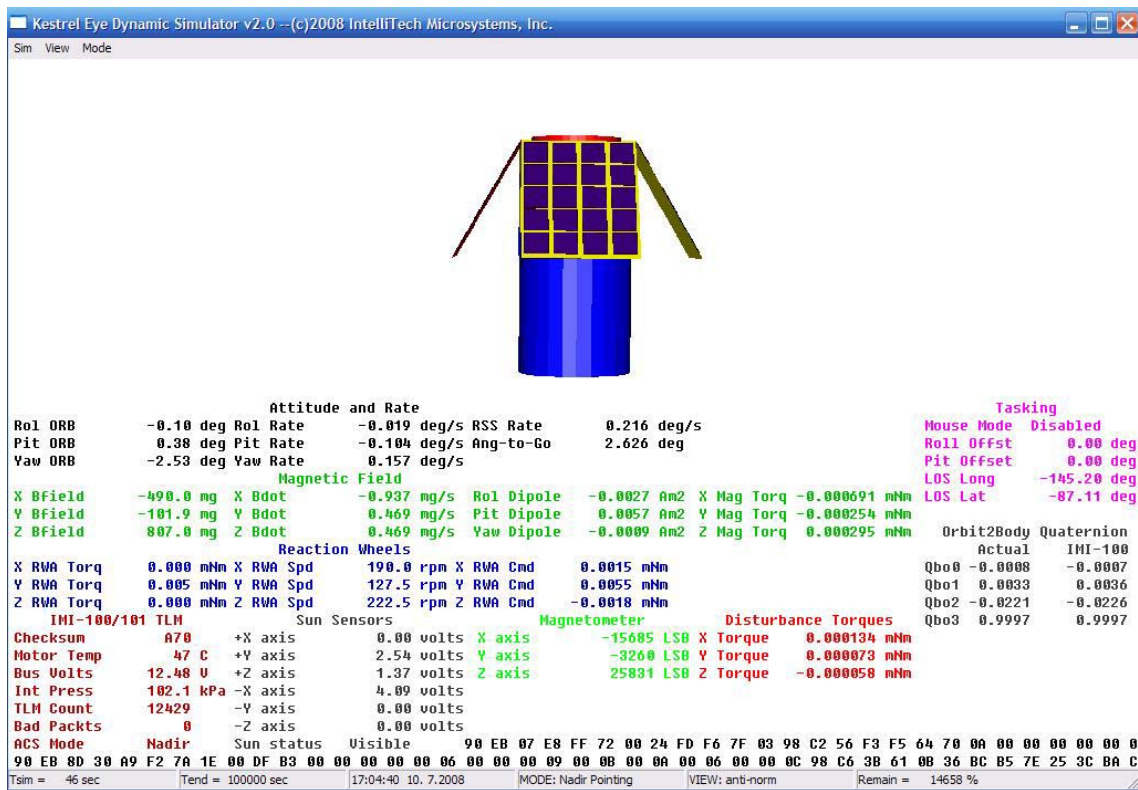




KEDS3D Dynamic Simulator Test Set

The dynamic simulator provides a HITL (Hardware In The Loop) test set for your IMI-100/101 which verifies and validates all software and hardware functions in a bench top setting. In the industry this is called a *flatsat* simulation. Flatsats are essential to develop and debug the ADACS software prior to launch. The concept is to simulate the dynamics of the satellite and the space environment in real time on a PC that is connected closed loop to the IMI-100 through the same electrical interfaces present on the spacecraft. The pc thus appears to the IMI-100 as the actual space vehicle and it endeavors to control the attitude of the simulated spacecraft. Actual IMI-100 actuator outputs, e.g. RWA speeds and magnetic torquer fields are sent to the pc where they are used to compute the dynamic response of the spacecraft.

A screenshot of the simulation is shown below.



Dynamic Simulator GUI



Dynamic Simulation

On the simulator computer is resident the spacecraft dynamics and control simulation. It can be tailored for the dynamics of any arbitrary spacecraft. This simulation runs on a Pentium PC or higher and incorporates the following high fidelity math models:

- Rigid and flexible body dynamics.
- Orbital mechanics model.
- IGRF 8th order magnetic field model.
- Atmospheric density model.
- Aerodynamic torques.
- Residual Dipole Torques.
- Gravity gradient torques.
- Sun and moon position.
- Solar pressure torques.

The simulation can run in either Standalone or HITL (Hardware-In-The-Loop) Modes. In Standalone mode the simulation can be used to study dynamic behavior in an all-software environment and test new control gains. In HITL mode, the simulation runs in exactly 1.0 times real time and is interfaced to an IMI-100/101 to perform flatsat testing.

Mission Specific Adaptations

If desired, we can build a graphic for your spacecraft and incorporate other specific models for your mission. Please inquire.