

## 6 DoF SATELLITE SIMULATOR

### SMALL SATELLITES

#### DESCRIPTION

6 Dof simulator intended to be used for spacecraft orbiting around the earth. Primarily used to evaluate the performance of different sensors and actuators in relation to their capability and also their position in the spacecraft.

#### FEATURES

- 6 Dof degrees of freedom simulator: Position, velocity, angular velocity and attitude expressed in form of quaternion or direction cosine matrix.
- Accurate Earth representation:
  - Earth gravitational model algorithm, corrected by latest GOCE satellite estimations.
  - Selectable G model order.
  - Earth magnetic field algorithm, world magnetic model 2010 from National Geospatial Agency.
  - Sun position algorithm, including sidereal time and precession-nutation of Earth.
  - Sun radiation algorithm.
- Multiple attitude profiles:
  - NADIR orientation of any face of the satellite.
  - Or any custom orientation into deep space.
- Control Algorithm: based on nonlinear slide control mode.
- Sensors and actuator: the following sensor/actuator are available to be parameterized and position on spacecraft:
  - Fine Sun sensor.
  - Coarse Sun sensor.
  - Magnetometer.
  - StarTracker.
  - Angular rate sensor.
  - Torque rod.
  - Reaction wheel.

- Analyze: complete telemetry from sensor/actuator and also internal variables can be plotted or exported to data file.
- Visualize: a complete tridimensional virtual reality model is built in to visualize the Earth, Sun and the satellite orbiting around. Different cameras can be set to get different views of the bodies.

#### APPLICATIONS

- Evaluate performance of actuators.
- Evaluate performance of sensors.
- Guidance & Navigation control loop performance.

