

In-orbit attitude actuation using solar panels

ABSTRACT

A specific technique is developed to wield the internal disturbance torque caused by the solar panel actuation for spacecraft attitude control tasks. This work is the maiden work towards integrating the attitude control and the solar tracking tasks, forming a combined attitude and solar tracking system. The feasibility of this concept for spacecraft is proven and eventually the combined concept is validated. A technical proof is presented corresponding to the end-to-end system demonstration. The investigation starts with the determination of the solar tracking constraints. Then, the mathematical models describing the attitude and solar tracking are established, and eventually the onboard architecture is implemented. The numerical treatments using Matlab[®] were performed to evaluate the developed onboard architecture. The simulation results are discussed especially from the attitude control standpoint. The integrated system complies very well with the reference mission requirements.

Keyword: Solar panel actuation; Attitude control systems; Spacecraft subsystems