

SPACE POWER SYMPOSIUM (C3)  
Small and Very Small Advanced Space Power Systems (4)

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OPTIMAL DESIGN OF THE POWER SYSTEM OF A SWARM OF NANOSATELLITES IN THE  
PROXIMITY OF AN ASTEROID

**Abstract**

The exploration of asteroids is one of the most interesting and challenging objectives of current and future space missions. In particular, the ESA/NASA mission AIDA with the ESA component AIM (Asteroid Impact Mission) is considering landing a nanosatellite on the surface of the binary asteroid Didymos. At the same time AIM provides COPINS the CubeSat Opportunity Payload Intersatellite Network-System to demonstrate CubeSat technology in deep space exploration missions. In both cases a nanosatellite needs to be designed to operate in deep space under environmental and operational conditions for which current nanosatellites are not designed. This paper will investigate the design and sizing of a flotilla of nanosatellite operating in the proximity of Didymos. In particular the paper will consider the power system and its integration with other subsystems. Given the large number uncertainties involved in a mission like AIM, the paper will consider the impact of uncertainty in component performance and operational conditions on the design and sizing of the nanosatellites. Different possible configurations with distributed use of the payload will be considered, and for each one a worst case optimal solution will be derived. The paper will consider also options in which the AIM spacecraft will provide power wirelessly to the flotilla.