University of Colorado at Boulder

AEROSPACE ENGINEERING SCIENCES

Seminar

Sara Spangelo

Systems Engineer / Research
Jet Propulsion Laboratory

Modeling, Designing, and Optimizing Small Spacecraft Vehicles and Operations

Small spacecraft are gaining a strong presence in academia, industry, defense, and NASA as a low-cost platform for performing novel technology demonstration and science missions. Based on experience designing, testing, and operating CubeSat missions, a framework, optimization formulations, and algorithms are presented to solve highly-constrained small spacecraft architectures. An analytical modeling framework and a high-fidelity simulation environment are presented that capture the interaction of dynamics, constraints, and requirements of spacecraft, targets, ground systems, and the external space environment. Optimization formulations are presented and used to solve operational scheduling problems that maximize science return and/or communication capacity for spacecraft in Low-Earth Orbit and interplanetary destinations. Applicability of this framework to optimize operational strategies for large scientific spacecraft missions with complex interacting requirements and constraints is discussed. Extensions of this work to integrated optimization of vehicle design and operational scheduling for multi-spacecraft architectures and interplanetary missions with ambitious scientific, observing, and exploration objectives are presented.

Wednesday

Michigan, she led the GPS subsystem and on