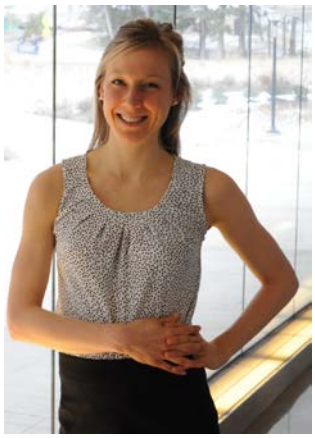
University of Colorado at Boulder

AEROSPACE ENGINEERING SCIENCES

Seminar



Sara Spangelo

Systems Engineer / Researcher

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, April 1, 2015
12:00 noon
DLC Collaboratory

Biography: **Dr. Sara Spangelo** completed a Ph.D. in aerospace engineering at the University of Michigan in December 2012 focusing on optimizing small spacecraft and ground systems architectures. While at Michigan, she led the GPS subsystem and on-orbit operational scheduling and execution of the Radio Aurora Explorer (RAX) CubeSat missions. She has consulted for software and aerospace companies. She currently works at NASA's Jet Propulsion Lab (JPL), where she has worked as the Lead systems Engineer for a Discovery-class concept, developed complex observing strategies for small and large spacecraft, and supported the development of a new Team X (concurrent design methodology) for CubeSats. Her recent research efforts have focused on optimizing trajectories and vehicles for small spacecraft with propulsion and designing advanced CubeSats for interplanetary and constellation architectures.