244. AUTONOMOUS RENDEZVOUS AND DOCKING STANDARDS

PROJECT AT-A-GLANCE
- **AST RDAB POC:** Demidovich, Nick
- **AST RESEARCH AREA:** 2.2 Vehicle Safety - Technologies
- **PRINCIPAL INVESTIGATOR:** Rock, Steve
- **EXECUTION ENTITY:** Stanford, UF, FSU
- **PERIOD OF PERFORMANCE:** Jan 3, 2011 - Jan 6, 2012
- **STATUS:** Ongoing

PROJECT DESCRIPTION

PURPOSE: Launch vehicles are nonlinear dynamic systems that require skill to maneuver in tight spaces as required for docking and berthing maneuvers (DBMs). This problem is akin to the difficult task of parallel parking for ground vehicles. However, whereas the latter task can be based on a simple kinematic model, DBMs for space vehicles require the use of more complex dynamic models due to the need to model the less precise actuators (e.g., thrusters) and to explicitly consider the inertia of the vehicle due to the lack of friction or environmental resistance.

OBJECTIVES: The motion planning will be based on Sampling Based Model Predictive Control (SBMPC), which is a synergy between the Model Predictive Control (MPC) paradigm used by control researchers and engineers and the sampling based planning methodologies popularized by robotics and artificial intelligence researchers. SBMPC, like MPC, uses dynamic models in planning and treats the inputs to the system as the optimization parameters. However, unlike MPC, it optimizes uses sampling and A*-type optimization, which enables it to avoid local minimum and be used for real-time planning and control.

GOALS: This project will develop the technology needed to automate DBM.