

DebrisSat – A Planned Laboratory-based Satellite Impact Experiment for Breakup Fragment Characterization

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DebrisSat is a planned laboratory-based satellite hypervelocity impact experiment. The goal of the project is to characterize the orbital debris that would be generated by a hypervelocity collision involving a modern satellite in low Earth orbit (LEO). The DebrisSat project will update and expand upon the information obtained in the 1992 Satellite Orbital Debris Characterization Impact Test (SOCIT), which characterized the breakup of a 1960's US Navy Transit satellite. There are three phases to this project: the design and fabrication of an engineering model representing a modern, 50-cm/50-kg class LEO satellite known as DebrisSat; conduction of a laboratory-based hypervelocity impact to catastrophically break up the satellite; and characterization of the properties of breakup fragments down to 2 mm in size. The data obtained, including fragment size, area-to-mass ratio, density, shape, material composition, optical properties, and radar cross-section distributions, will be used to supplement the DoD's and NASA's satellite breakup models to better describe the breakup outcome of a modern satellite. Updated breakup models will improve mission planning, environmental models, and event response.

The DebrisSat project is sponsored by the Air Force's Space and Missile Systems Center and the NASA Orbital Debris Program Office. The design and fabrication of DebrisSat is led by University of Florida with subject matter experts' support from The Aerospace Corporation. The major milestones of the project include the complete fabrication of DebrisSat by September 2013, the hypervelocity impact of DebrisSat at the Air Force's Arnold Engineering Development Complex in early 2014, and fragment characterization and data analyses in late 2014.