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Impact-Induced Mission Effects and Risk Assessments (3)Author: Ms. Samantha Allen
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BIGGER FRAGMENTS BIGGER PICTURE – CHARACTERIZING DEBRISAT FRAGMENTS

Abstract

The DebrisSat project was conceived to provide NASA and the DoD with an updated dataset to improve existing break-up models. One of the key sets of parameters used in the break-up models is the fragment's physical characteristics including its characteristic length, average cross-sectional area, volume, and area-to-mass ratio. The DebrisSat test article was engineered to obtain these parameters with components, materials, and processes commonly utilized in modern LEO satellites and subjected to a laboratory hypervelocity impact (HVI) test to emulate a catastrophic on-orbit collision. In the post-HVI phase, all fragments with at least one linear dimension greater than or equal to 2 mm are carefully collected, characterized, and recorded in the Debris Categorization System database. After five years of processing fragments from the laboratory HVI test, over 189,000 fragments have been collected to date, comparatively higher than the 85,000 fragments predicted by the current break-up model. The fragments characterized to date equate to roughly 30% of the total predicted fragments. This paper discusses the updates and additions to all post-HVI activities, characterization data, and the challenges encountered in effort to streamline all process while maintaining high-quality data amongst ever-changing technicians. The paper provides the orbital debris community with the latest on the project status, a glimpse into the current dataset, and difficulties faced while processing the DebrisSat satellite fragments.