

PRELIMINARY CHARACTERIZATION RESULTS FROM THE DEBRISAT PROJECT

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The DebrisSat project is a continuing effort sponsored by NASA and DoD to update existing break-up models using data obtained from two separate hypervelocity impact tests used to simulate on-orbit collisions. To protect the fragments resulting from the impact tests, "soft-catch" arenas made of polyurethane foam panels were utilized. After each impact test, the test chamber was cleaned and debris resulting from the catastrophic demise of the test article were collected and shipped to the University of Florida for post-impact processing. The post-impact processing activities include collecting, characterizing, and cataloging of the fragments.

Since the impact tests, a team of students has been working to characterize the fragments in terms of their mass, size, shape, color and material content. The focus of the 20 months since the impact tests has been on the collection of 2 mm and larger fragments resulting from impact test on the 56 kg representative LEO satellite referred to as DebrisSat. To date we have recovered in excess of 115K fragments, 30K more than the prediction of 85K fragments from the existing model. We continue to collect fragments but have transitioned to the characterization phase of the post-impact activities. Since the start of the characterization phase, the focus has been to utilize automation to (i) expedite fragment characterization process and (ii) minimize human-in-the-loop. We have developed and implemented such automated processes; e.g., we have automated the data entry process to reduce operator errors during transcription of the measurement data. However, at all steps of the process, there is human oversight to ensure the integrity of the data. Additionally, we have developed and implemented repeatability and reproducibility tests to ensure that the instrumentation used in the characterization process is accurate and properly calibrated. In this paper, the implemented processes are described and preliminary results presented. Additionally, lessons learned from the implemented automations and their impacts on the integrity of the results are discussed.