SPACE DEBRIS SYMPOSIUM (A6)
Measurements (1)

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DATA COLLECTED DURING THE POST-FLIGHT SURVEY OF MICROMETEOROID AND ORBITAL DEBRIS IMPACT FEATURES ON THE HUBBLE WIDE FIELD PLANETARY CAMERA 2

Abstract

Over a period of five weeks during the summer of 2009, personnel from the NASA's Orbital Debris Program Office and Meteoroid Environment Office performed a post-flight examination of the Hubble Space Telescope (HST) Wide Field Planetary Camera 2 (WFPC-2) radiator. The objective was to record details about all micrometeoroid and orbital debris (MMOD) impact features with diameters of 300 μm and larger. The WFPC-2 was located in a clean room at NASA's Goddard Space Flight Center. Using a digital microscope, the team examined and recorded position, diameter, and depth information for each of 685 craters. Taking advantage of the digital microscope's data storage and analysis features, the actual measurements were extracted later from the recorded images, in an office environment at the Johnson Space Center.

Measurements of the crater include depth and diameter. The depth was measured from the undisturbed paint surface to the deepest point within the crater. Where features penetrate into the metal, both the depth in metal and the paint thickness were measured. In anticipation of hypervelocity tests and simulations, several diameter measurements were taken: the spall area, the area of any bare metal, the area of any discolored ("burned") metal, and the lips of the central crater. In the largest craters, the diameter of the crater at the surface of the metal was also measured. The location of each crater was recorded at the time of inspection. This paper presents the methods and results of the crater measurement effort, including the size and spatial distributions of the impact features. This effort will be followed by taking the same measurements from hypervelocity impact targets simulating the WFPC-2 radiator. Both data sets, combined with hydrocode simulation, will help validate or improve the MMOD environment in low Earth orbit.