Space Breakup Events Modeling and Analysis

J.-C. Liou, PhD
Chief Scientist for Orbital Debris
National Aeronautics and Space Administration

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The model is based on well-observed on-orbit explosions of launch vehicle upper stages.

(Johnson et al., ASR, 2001)
The model is based on limited on-orbit data and laboratory-based impact experiments (Johnson et al., ASR, 2001).
New Laboratory Impact Experiments

- To better understand the outcome of an on-orbit collision, such as the accidental collision between Iridium 33 and Cosmos 2251 in 2009, NASA is leading a US-based consortium on new laboratory impact experiments
  - The goal is to collect new data to improve the satellite breakup model

598 g projectile @ 6.9 km/sec

570 g projectile @ 6.8 km/sec

(Liou et al., ODQN, 2014)
• The NASA Satellite Breakup Model is used by the international space community to support various applications
  – Space Situational Awareness
  – Short- and long-term OD impact risks from a new breakup event to critical space assets, including the International Space Station
  – Short- and long-term effects from major breakup events to the OD population increase in the environment