Characterization of Space Shuttle Ascent Debris Based on Radar Scattering and Ballistic Properties -- Evolution of the NASA Debris Radar System

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Place: Large Conference Room, ElectroScience Laboratory,
1330 Kinnear Rd, Columbus, OH 43212

Abstract: This presentation introduces the NASA Debris Radar (NDR) system developed to characterize debris liberated by the space shuttle (and any follow-on rocket system) during its ascent into space. Radar technology is well suited for characterizing shuttle ascent debris, and is especially valuable during night launches when optical sensors are severely degraded. The shuttle debris mission presents challenging radar requirements in terms of target detection and tracking, minimum detectable radar cross-section (RCS), calibration accuracy, power profile management, and operational readiness. The NDR system consists of stationary C-band radar located at Kennedy Space Center (KSC) and two X-band radars deployed to sea during shuttle missions. Various sizes, shapes, and types of shuttle debris materials were characterized using static and dynamic radar measurements and ballistic coefficient calculations. The presentation also discusses the NASA Debris Radar (NDR) successes, which led to a new challenge of processing and analyzing the large amount of radar data collected by the NDR systems and extracting information useful to the NASA debris community. Analysis tools and software codes were developed to visualize the shuttle metric data in real-time, visualize metric and signature data during post-mission analysis.

Bio: Dr. Brian M. Kent, a member of the scientific and professional cadre of senior executives, is Chief Scientist, Sensors Directorate, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio. He serves as the directorate's principal scientific and technical adviser and primary authority for the technical content of the science and technology portfolio. He evaluates the total laboratory technical research program to determine its adequacy and efficiency in meeting national, Department of Defense, Air Force, Air Force Materiel Command and AFRL objectives in core technical competency areas. He identifies research gaps and analyzes advancements in a broad variety of scientific fields to advise on their impact on laboratory programs and objectives. He recommends new initiatives and adjustments to current programs required to meet current and future Air Force needs. As such, he is an internationally recognized scientific expert, and provides authoritarian counsel and advice to AFRL management and the professional staff as well as to other government organizations.