The Albuquerque IEEE Joint Chapter of AP/MTT/EMC/NPS Presents

TOPIC OF TALK: Return-to-Flight Electromagnetic Measurements – The NASA Shuttle Ascent Debris Radar System

PRESENTED BY:

Brian M. Kent, Ph.D., Fellow, IEEE, AMTA,
Senior Scientist and S&T Lead EM, RF, and Sensing Systems
Emerald Coast Division, Applied Research Associates (ARA.com)
Distinguished Lecturer, IEEE Antennas & Propagation Society

TIME: **7:30 pm, Wednesday, May 20, 2015**
Social begins at 5:45 pm
Dinner begins at 6:30 pm

PLACE: The Canyon Club (Formerly Four Hills Country Club)
911 Four Hills Road, SE, Albuquerque, NM 87123

DINNER: Soup of the Day, Atlantic Grilled Salmon, Grilled Asparagus, Polenta Cake, Warm Tomato Vinaigrette, Dinner rolls & Butter, Chef's Choice Dessert, Coffee, Iced Tea and Water (Vegetarian entrée available by request at time of RSVP)

COST: No charge and no reservation required to attend just the talk.
$25 per person for dinner (full-time student members of IEEE, $15)—reservations required
RSVP by email to harrisonmgabq@comcast.net or phone Mike Harrison at (505) 239-2663.

Reservations & cancellations accepted until NOON, Monday, May 18. 2015. The Canyon Club can often make latearrangements so it it is worthwhile to contact Mike Harrison after Monday, May 18, if you wish to join us for dinner.

PRESENTATION SUMMARY:

The NASA Debris Radar (NDR) system was developed to characterize ascent debris liberated during the Shuttle's ascent into space. Radar is well suited for characterizing ascent debris, and is essential during night launches when optical sensors are severely degraded. The NDR mission presents challenging radar requirements in terms of target detection, tracking, minimum detectable radar cross-section (RCS), calibration accuracy, power profile management, and operational readiness. After revisiting the Columbia accident investigation, I describe the NDR system, consisting of a stationary C-band radar located at Kennedy Space Center and two sea-based X-band radars. During the 3 year development effort, the NDR team examined static and dynamic radar signatures of the shuttle and liberated debris, and executed an "in-situ" Electromagnetic Interference Measurement on the Orbiter "Discovery" to certify its safety from radar EMI. Since Shuttle Mission Managers needed definitive safety assessments within 24-30 hrs of launch, analysis tools and software provided shuttle metric data in real-time, visualize metric and signature data during post-mission analysis, automatically detect and characterize debris tracks in signature data, determine ballistic numbers for detected debris objects, and assess material type, size, release location and threat to the orbiter based on radar scattering and ballistic properties of the debris.

Biography of the Speaker:

Dr. Brian M. Kent joined Applied Research Associates (ECD, Fairborn, Ohio office) as Senior Scientist and S&T Lead for Electro-magnetics (EM), Radio Frequency (RF), and Sensing Systems. ARA is an employee-owned scientific research and engineering company founded in 1979 and dedicated to producing innovative solutions that tackle critical national problems in National Security, Infrastructure, Energy and Environment, and Health Solutions. (www.ARA.com) Dr. Kent will support corporate ARA technical efforts, and will work to expand S&T opportunities in his area of expertise. In addition, Dr. Kent will continue to serve as Adjunct Professor of Electrical Engineering with Michigan State University's Department of Electrical Engineering.

Dr. Kent is a Fellow of the Institute of Electrical and Electronics Engineering and an international IEEE Distinguished Lecturer for the Antenna and Propagation Society. He is also a Fellow of the Antenna Measurement Techniques Association and of the Air Force Research Laboratory. He also was a 2009 Meritorious Presidential Rank Awardee.

Previously, Dr. Brian M. Kent, was a member of the scientific and professional cadre of senior executives, is the Chief Technology Officer, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio. He serves as AFRL's principle scientific/technical advisor 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, DoD, USAF, AFMC, 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 the 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. He also collaborates on numerous interdisciplinary research problems that encompass multiple AFRL directorates, customers from other DOD components, as well as the manned space program managed by NASA.

His technical specialties include EM Scattering & material property measurements, Radar, Antenna, and Radar Cross Section Measurements, Radar Performance Evaluation, RF/EO Sensing Technologies, Passive/Active Electronic Warfare, and co-serves as an Adjunct Professor (Michigan State University). He is an active IEEE Fellow and APS Distinguished Lecturer, an Antenna Measurement Techniques Association Fellow, and an Air Force Research Laboratory Fellow.