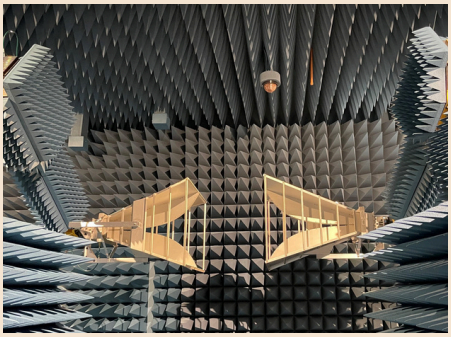
Innovative Techniques to Improve Measurement Accuracy



Abstract

This workshop presents innovative techniques to improve measurement accuracy in antenna calibration, focusing on traceability, uncertainty estimation, and environmental impacts. Topics include numerical approaches to uncertainty estimation, enhanced calibration using complex VNA S-parameters, and time-domain gating to assess test environment effects. A live demonstration will showcase time-domain gating for antenna gain measurements, offering practical insights into modern calibration methods.

Workshop outline

We have invited several excellent speakers from industry, government/defense, and academia who are well-known researchers in the EuCAP and AMTA communities. Each speaker will present for approximately 30 minutes followed by a LIVE demonstration to make the workshop very interactive between the speakers and the attendees. Two of the speakers were nominated for (Mr. Chen) or received (Prof. Breinbjerg) the EuCAP 2024 Best Measurement Paper Award. The order of speakers and their respective presentations will be as follows:

1. Dennis Lewis with Boeing: Overview of Antenna Measurement Traceability and Factors Effecting Measurement Accuracy.
2. Olav Breinbjerg with ElMaReCo: Numerical Uncertainty Estimation Replacing Time-Consuming Experimental Uncertainty Estimation.
3. Thomas Klien-Ostmann with PTB: Antenna Gain Calibration Using Near-Field Techniques.
4. Yahya Rahmat-Samii with UCLA: How Near-Field Probe Size and Misalignments Impact the Accuracy of Far-Field Pattern Constructions: Novel Recommendations.
5. David Knight with NPL: Extended Applications Using Complex VNA S-Parameters to Enhance Antenna Calibration Measurements.
6. Zhong Chen with ETS-Lindgren: Time-Domain Gating and Edge Treatment Techniques for Improved Accuracy in Antenna Measurements (includes live demonstration with antennas and VNA).

Speakers

Dennis Lewis, The Boeing Company, received his BS EE degree with honors from Henry Cogswell College and his MS degree in Physics from the University of Washington. He has worked at Boeing in Seattle, Washington, for 35 years and is recognized as a Technical Fellow, leading the enterprise antenna measurement capability for the Boeing Test and Evaluation Electromagnetics group. Dennis holds 12 patents and received the 2013 and 2015 Boeing Special Invention Awards. Speaker is an AMTA Fellow.

Zhong Chen, ETS-Lindgren, Chief Engineer, is located in Cedar Park, Texas. He has over 25 years of experience in RF testing, anechoic chamber design, EMC antenna and field probe design and measurements. He is Vice-Chairman of ANSC C63® responsible for the antenna calibration (ANSI C63.5) and chamber/test site validation standards (ANSI C63.4 and ANSI C63.25 series). His interests include measurement uncertainty, time domain measurements for site validation and antenna calibration, and development of novel RF absorber materials. Zhong Chen received his M.S.E.E. degree in Electromagnetics from the Ohio State University at Columbus. Mr. Chen was a candidate for the EuCAP 2024 Best Measurement Paper Award.

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Olav Breinbjerg received the Ph.D. degree from the Technical University of Denmark (DTU) in 1992. He was on the Faculty of DTU's Department of Electrical Engineering as an Assistant Professor, Associate Professor, and from 2006-2021 as Full Professor. From 1997 to 2021 he was also Head of the Electromagnetic Systems Group and the DTU-ESA Spherical Near-Field Antenna Test Facility, and he founded the DTU Electromagnetic Test Centre. He resigned his position at DTU in May 2021 and founded ElMaReCo for independent research consultancy. Olav Breinbjerg is Fellow of AMTA and IEEE and the 2024-2025 AMTA Distinguished Speaker. He received the EuCAP 2024 Best Measurement Paper Award.

Yahya Rahmat-Samii, UCLA, is a Distinguished Professor, holder of the Northrop-Grumman Chair in electromagnetics, member of the US National Academy of Engineering (NAE), winner of the 2011 IEEE Electromagnetics Field Award and the former chairman of the Electrical and Computer Engineering Department at UCLA. Dr. Rahmat-Samii was the 1995 President of the IEEE Antennas and Propagation Society and 2009-2011 President of the United States National Committee (USNC) of the International Union of Radio Science (URSI). Dr. Rahmat-Samii has authored or co-authored over 1000 technical journal articles and conference papers and has written over 40 book chapters and six books.

David Knight, NPL, graduated in 1990 with BSc (Hons) Physics from Imperial College (London). After work at British Aerospace Space Systems designing satellite control systems, he completed an MSc in control theory in 1993. He joined NPL (Teddington, UK) where he is a senior research scientist, responsible for the VHF/UHF free field group, with focus on bespoke methods for novel antenna design projects. He has developed improvements in the calibration of standard types of antenna, for which he won an NPL Innovation Award. He contributes to national/international standard committees, such as the BSI GEL/210 (UK) and IEC CISPR/A (international).

Thomas Kleine-Ostmann, Physikalisch-Technische Bundesanstalt (PTB), is heading the department "High Frequency and Electromagnetic Fields" at PTB since 2020. There, he is responsible for representation and dissemination of fundamental and derived radio frequency quantities including the required metrological research to establish traceability of new quantities, assessments within accreditation, national and international intercomparisons and standardization work. Before, he was heading the "Electromagnetic Fields and Antenna Measuring Techniques" working group for many years. He has the venia legendi at TU Braunschweig, where he is teaching in the field of high frequency and mobile communication measuring techniques.