

# Automotive Test Methodologies for Performance Verification of Modern Vehicles

## **ORGANIZERS:**

Janet O'Neil, ETS-Lindgren  
Garth D'Abreu, ETS-Lindgren

## **ABSTRACT:**

Automotive EMC Technology continues to dramatically move forward with the growing acceptance of vehicles with increasing levels of automated assistance features as well as the ongoing development of increasing levels of autonomy. At the same time, there is the ever-present concern about the dependability and inherent safety of vehicles with sophisticated levels of advanced driver assistance systems (ADAS). ADAS features, including adaptive cruise control, autonomous emergency braking, lane departure warning systems, and blind spot warning, to name a few, are standard features drivers have come to expect, some of which will soon become mandatory in the European Union. Connectivity is also becoming a more prevalent component of the increasingly autonomous vehicle. The presentations in this workshop will address the importance of full vehicle antenna passive and over-the-air (OTA) testing to assess communication performance under representative conditions. A review will be provided of the latest methodologies for radar testing on full vehicles and components to address performance concerns. The latest trends in automotive test environments, such as reverberation and anechoic chambers, will be discussed with recommendations provided for the optimal chamber type for the specific application.

Attendees of this workshop will learn about the latest challenges facing automotive OEMs. Those that design automotive EMC/Antenna Pattern Measurement (APM) test chambers, and offer commercial automotive EMC/APM and OTA test services, will also benefit from the developing solutions to these challenges presented.

The workshop presents different perspectives – both current and future – on modern Automotive EMC/APM Technology.

## **TALKS:**

### **Implementing Vehicle Level Measurements for Advanced Driver Assistance Systems**

*Mr. Garth D'Abreu, ETS-Lindgren, Cedar Park, Texas, USA*

### **Test Procedures to Assess the Immunity of Automotive Electronics by the Use of Near-Field Probes**

*Dr. Xinglong Wu, Politecnico di Milano, Milan, Italy*

### **Chamber Design Considerations for EMC and Antenna Pattern Measurements of Full Vehicles by Mr.**

*Zhong Chen, ETS-Lindgren, Cedar Park, Texas, USA*

### **Advances in the Intelligent Connected Vehicles EMC Test Standardization in China-SAE**

*Mr. Yuanliang Peng, China Automotive Engineering Research Institute Co., LTD/ EMC Test Department, China*

## BIOS OF ORGANIZERS & SPEAKERS



**Garth D'Abreu** is the Director, Automotive Solutions at ETS-Lindgren based at the corporate headquarters office in Cedar Park, Texas. He has primary responsibility for the design and development functions worldwide within the Systems Engineering group, specializing in turn-key solutions for Automotive EMC and Wireless test integration. Some of these more complex full vehicle and electronic sub-assembly (ESA) test chambers involve his coordination with the RF engineering team on custom components, and the certified, internal Building Information Modeling (BIM) team at ETS-Lindgren.

Due to his considerable industry experience, he is the ETS-Lindgren global subject matter expert responsible for the ongoing research and development of Automotive EMC / Wireless test chambers for Regular, Electric/Hybrid Electric and Autonomous Vehicles, focusing on combination anechoic chambers, reverberation chambers, GTEM cells, EMP protection applications and wireless device test systems. Mr. D'Abreu is a Senior Member of the IEEE EMC Society and is designated as a Distinguished Lecturer (2022-2023) by the Society. He and active participant in standards development, including the SAE, ISO and CISPR D automotive EMC standards, with over 30 years of experience in the RF industry. Mr. D'Abreu holds a BSc degree in Electronics & Communications Engineering, from North London University, UK. He may be reached at [garth.dabreu@ets-lindgren.com](mailto:garth.dabreu@ets-lindgren.com).



**Janet O'Neil** is a customer relations specialist with ETS-Lindgren. She has over 30 years of experience in the RF and Electromagnetic Compatibility (EMC) industries. She is a member of the Board of Directors of the IEEE EMC Society and a past member of the Antenna Measurement Techniques Association (AMTA) Board of Directors. Janet is a member of Subcommittee 1 (Techniques and Development) of ANSC C63®, and is chair of the 2022 IEEE International Symposium on EMC in Spokane, WA; was vice-chair of the 2011, 2018, and 2019 IEEE International Symposiums on EMC; and a member of the organizing committee for the IEEE International Microwave Symposium (IMS) 2013 in Seattle, Washington - where she organized a Wireless Industry Day special session - as well as a member of the IMS 2020, 2022, and 2023 organizing committees. She contributed to the IEEE IMS 5G Summit in 2018/2019. Janet created the regional "tabletop show" for the IEEE EMC Society in 1990 and for the AMTA in 2005 to bring engineering education to the local community and link industry, academia, and government sectors. Janet is the EiC of the IEEE Electromagnetic Compatibility Magazine. Her education includes BA degrees in English and in Business Economics from the University of California, Santa Barbara.



**Xinglong Wu** received the Double Master (M.Sc.) Degree in electrical engineering (EE) from Xi'an Jiaotong University, Xi'an, China and Politecnico di Milano, Milan, Italy, in 2015, and the Ph.D. degree (summa cum laude) in EE from Politecnico di Milano, in 2019. He is currently an Assistant Professor with Department of the Electronics, Information and Bioengineering, Politecnico di Milano. In March 2017 and June 2017, he was a Visiting Scientist with Electromagnetics Group, Department of Information Technology, Ghent University, Belgium. From 2019 to 2020, he was a Postdoctoral Research Fellow with Politecnico di Milano. His research interests include distributed

parameter circuit modeling, statistical techniques for electromagnetic compatibility (EMC), experimental procedures and setups for EMC testing, and system-level EMC. He was a recipient of the International Union of Radio Science (URSI) Young Scientist Award from 2020 URSI General Assembly and Scientific Symposium.



**Zhong Chen** is the Director of RF Engineering at ETS-Lindgren, located in Cedar Park, Texas. He has over 25 years of experience in RF testing, anechoic chamber design, as well as EMC antenna and field probe design and measurements. He is an active member of the ANSC C63® committee and Chairman of Subcommittee 1 which is responsible for the antenna calibration (ANSI C63.5) and chamber/test site validation standards (ANSI C63.4 and the ANSI C63.25 series). Mr. Chen is chairman of the IEEE Standard 1309 committee responsible for developing calibration standards for field probes, and IEEE Standard 1128 for absorber evaluation. Currently he is a member of the Antenna

Measurement Techniques Association (AMTA) Board of Directors. His research 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. He may be reached at [zhong.chen@ets-lindgren.com](mailto:zhong.chen@ets-lindgren.com).



**Yuanliang Peng** received the Master (M.Sc.) Degree in electrical and electronic engineering (EEE) from the University of Sheffield, UK, in 2020. Currently he is a Test Engineer at State Key Laboratory of Vehicle NVH and Safety Technology of China Automotive Engineering Research Institute Co., LTD in Chongqing, China. Previously, he was a project manager of electromagnetic immunity test methods for vehicle advanced driver assistance systems (ADAS) based on multi-sensor fusion. His research interests include electromagnetic compatibility (EMC) vehicle-level testing, advanced driver assistance systems, automated driving functions (ADAS/AV), and functional safety. He may be reached at [pengyuanliang@caeri.com.cn](mailto:pengyuanliang@caeri.com.cn).