  



**IEEE Los Angeles and Orange County EMC Chapters and**

**Los Angeles MTT/AP Chapter Meeting Announcement**

**Recent Developments in EMC Design and Test for**

**Improved Measurements and Performance Evaluation**

***This is a free seminar, but you must register IN ADVANCE***

***no later than Friday, September 9 to ensure adequate seating and catering. The Toyota Automotive Museum exhibits are also available for viewing at no charge to IEEE seminar attendees.***

**Date: Tuesday, September 13, 2016**

**Time:**  3:00 pm – 3:30 pm Registration

3:30 pm – 6:15 pm Presentations, including a break between speakers

6:15 pm – 7:00 pm Refreshments with speakers; tour of museum exhibits

**Location:** The Toyota Automotive Museum, 19600 Van Ness Ave., Torrance, CA 90501

Museum Phone: 310-468-8726,Website: [www.toyotausamuseum.com](http://www.toyotausamuseum.com/)

See map for directions. There is plenty of free parking near the entrance to the museum.

**RSVP:** Contact Eric Hahn with Altamont Technical Services at (858) 472-7666 or email [eric@atsemc.com](mailto:eric@atsemc.com) for more information and to RSVP. [You can also reserve on line – just click here](http://ieeetorrance.eventbrite.com). SPACE IS LIMITED – RESERVE EARLY TO SAVE YOUR SPACE!!!

**Refreshments Provided Courtesy of:**



**TECHNICAL PROGRAM**

**Presentation 1: Measurements and Modeling: Two Very Similar Mindsets**

*By Colin Brench, Amphenol TCS in Nashua, New Hampshire*

**Abstract:** Computational electromagnetic solvers have become very powerful and are now in common use for EMC design and analysis efforts. Often daunting to someone new in the field, there is an extremely close parallel between how a measurement is made and how a computer simulation is constructed. Once this similarity is understood, a lot of the mysticism is cleared away and the path is open to embrace these techniques. The parallels for measurements made in an open area test site as well as for reverberation chambers will be discussed. This presentation explains the basics of the computational approaches in use; their applications are all given in terms familiar to those comfortable in a test lab. An example is included that demonstrates a practical EMI shielding analysis and design process taken directly from an issue that involved a telecommunications server.

**Presentation 2: EMC Chamber Design for Vehicle and Electronic Sub-Assemblies (ESA)** **Testing**

***By Garth D’Abreu, Director, Automotive Solutions at ETS-Lindgren, Cedar Park, Texas***

**Abstract:** The design and development of electronic components, and the eventual testing for regulatory compliance, both share the common requirement for a suitable environment for performing EMC measurements. We have seen the development of design techniques over several years and benefited from the test experience as evident in the current versions of the industry standards. The time spent working with the traditional 12 V system has been changing in recent years with the introduction and increasing implementation of electric and hybrid vehicles. This has led to the development of higher voltage and current busses on vehicle platforms and the increasing use of electric motors and inverter drives have led to changes in the design and implementation of these new systems to meet the EMC requirements for regulation and interoperability. Vehicle platforms continue to become increasingly more complex with propulsion, entertainment and safety related systems all having to function reliably without impacting safety or the legacy communications infrastructure. This has driven the need for ever increasing permutations of system operation, operating frequency ranges and immunity levels. This will be discussed in light of current EMC testing and the development of new global standards. This presentation provides an overview of some of the main automotive EMC standards with their current and pending revisions, and looks at the test environment options for meeting the requirements for performing conducted and radiated immunity and emission measurements on whole vehicles and ESA's (Electronic Sub-assemblies).

**Presentation 3: Common Mode Signals on Differential lines, Their Impact on EMC and How to Control Them with Electromagnetic Band Gap (EBG Filters)**

***By Bruce Archambeault, PhD, IEEE Fellow, IBM Distinguished Engineer Emeritus, North Carolina***

**Abstract:** High speed signals are most often run as a differential pair to improve signal integrity. If the signals are perfectly balanced, then there is very little radiation from the differential pair. However, this is NEVER the case. Small amounts of in-pair skew, small amounts of rise/fall time mismatch and/or small amounts of amplitude mismatch will create significant amount of common mode signals. These common mode signals cause significant emissions, especially at the Gb/s rates of these high speed signals.This talk will discuss the various ways these common mode signals affect EMC performance, and where the focus areas are within real world system development. Control of these common mode signals is very difficult. Discrete filters can include too much inductance at GHz frequencies for the differential signal, making them undesirable. Board-to-board connectors can induce skew, causing EMI ‘noise’ between two PCB ground-reference planes. External I/O cables with common mode signals will cause emissions level too high to meet regulations.This is a very serious problem for industry with no clean and simple solutions. EBG filters, lossy material, discrete filters, all have potential draw backs to implementation in certain application. Data rates are continuing to increase, and 25 Gb/s data rates in computers are only a few years away!

**SPEAKER BIOGRAPHIES**

**Mr. Colin Brench** received his B.Sc. (Honours) in Electronic Engineering at The City University, London, in 1975. He has been particularly active in the areas of antenna and shielding behavior and EMC since the early 1970's. In his current position at Amphenol TCS in Nashua, NH, Colin is responsible for the EMC aspects of high data rate (10 to 56 Gb/s) interconnect schemes. His previous position was at Southwest Research Institute (SwRI) in San Antonio where he was a staff engineer in the Electromagnetic Compatibility Research group. His responsibilities at SwRI included developing new EMC technologies and providing consulting and training. Previous to that, he worked for 21 years at Hewlett-Packard (formerly Compaq Computer Corporation, formerly Digital Equipment Corporation) where he was involved in a wide range of server, workstation, and networking products. Mr. Brench has presented numerous EMC training classes that embrace a broad range of topics including microprocessor packaging, printed circuit module issues, system design, and shielding.  He is a co-author of the book, EMI/EMC Computational Modeling Handbook (Springer Science & Business Media, 2nd Edition 2001), and has authored over 20 technical papers and articles.  In addition, he holds 12 patents for various methods of EMI control.  Mr. Brench was appointed a Distinguished Lecturer for the IEEE EMC Society for 2001 and 2002. In 2002 he was awarded the Certificate of Technical Achievement by the IEEE EMC Society for his contributions to the development of EMC modeling directed to understanding EMI shielding and antenna behavior. Mr. Brench is a Senior Member of the IEEE, a member of the EMC Society since 1980, and has been an iNARTE certified EMC Engineer since 1990. He is also active in IEEE EMC-S standards, IEEE EMC-S Technical Committee 9 (TC-9), and ANSI ASC C63.  He is currently serving as the VP for Technical Services on the IEEE EMC Society Board of Directors.



**Mr. 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 and Hybrid Electric Vehicles, focusing on combination anechoic chambers, reverberation chambers, GTEM cells, EMP protection applications and wireless device test systems.  Mr. D’Abreu is a member of the IEEE EMC Society and active participant in standards development, including the SAE, ISO and CISPR D automotive EMC standards, with over 25 years of experience in the RF industry.  He holds a holds a BSc degree in Electronics & Communications Engineering, from North London University, UK.

 Dr. Bruce Archambeault is an IEEE Fellow, an IBM Distinguished Engineer Emeritus and an Adjunct Professor at Missouri University of Science and Technology. He received his B.S.E.E degree from the University of New Hampshire in 1977 and his M.S.E.E degree from Northeastern University in 1981. He received his Ph. D. from the University of New Hampshire in 1997. His doctoral research was in the area of computational electromagnetics applied to real-world EMC problems. He has taught numerous seminars on EMC and Signal Integrity across the USA and the world, including the past 14 years at Oxford University. Dr. Archambeault has authored or co-authored a number of papers in computational electromagnetics, mostly applied to real-world EMC applications. He is a member of the Board of Directors for the IEEE EMC Society and a past Board of Directors member for the Applied Computational Electromagnetics Society (ACES). He currently serves as the Vice-president for Conferences of the EMC Society. He has served as a past IEEE/EMCS Distinguished Lecturer, EMCS TAC Chair and Associate Editor for the IEEE Transactions on Electromagnetic Compatibility. He is the author of the book “PCB Design for Real-World EMI Control” and the lead author of the book titled “EMI/EMC Computational Modeling Handbook”.