

October 2017
Event

Rock River Valley Section
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The **I**nstitute of **E**lectrical and **E**lectronic **E**ngineers, Inc.

IEEE RRV Section, EMC Chapter Meeting
SERVING IEEE MEMBERS OF NORTH CENTRAL ILLINOIS AND SOUTH CENTRAL WISCONSIN

WHEN Thursday, October 26, 2017

WHERE

National Technical Systems (NTS)
3761 S. Central Ave
Rockford, IL 61102

AGENDA

5:30 PM NTS Tour
6:30 PM Dinner
7:15 PM Presentation



Utilizing Reverberation Chambers as a Versatile Test Environment for Assessing the Performance of Components and Systems

Dennis Lewis

Technical Fellow, Boeing
EMC Society Board Member and Past Distinguished Lecturer

Electromagnetic reverberation chambers have been used for many years by the Electromagnetic Compatibility (EMC) community to measure the susceptibility and emissions for various electronic components and systems. This presentation describes how statistical processes were used to reduce the uncertainty of these chambers to a level necessary for precision metrology applications. These processes were applied to the calibration of electromagnetic field probes and the assessment of antenna efficiencies. A brief comparison of traditional calibration methods employing transverse electromagnetic (TEM) cells and anechoic chambers to the new statistical reverberant environment will be shown.

The presentation also goes on to explain how these techniques were later applied to a wide variety of aircraft measurements. A technique which utilizes two side by side reverberation chambers sharing a common wall with an arbitrary shaped aperture, useful for the assessment of component shielding, will be discussed. Utilizing this same approach, it is possible to assess the shielding of large structures such as commercial aircraft. These aircraft shielding measurements are necessary for High Intensity Radiated Field Susceptibility (HIRF) certifications.

With the proliferation of wireless devices it is important to understand how they behave in complex electromagnetic environments and how they interact with other devices and systems in which they are collocated. Aircraft environments have been shown to behave similarly to reverberation chambers and therefore these techniques can be employed to study propagation environments and system interactions. This presentation will give examples of how these techniques were employed to measure bulk absorption used to simulate passenger loading of aircraft, field mapping which is useful for the evaluation of signal coverage and channel interference as well as signal propagation characteristics.

Dennis Lewis 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 for 29 years and is recognized as a Technical Fellow. He currently has leadership and technical responsibility for the primary RF, Microwave and Antenna Metrology labs. Dennis holds eight patents and is the recipient of the 2013 & 2015 Boeing Special Invention Award. He is a member of the IEEE and several of its technical societies including the Microwave Theory and Techniques Society (MTT-S), the Antennas and Propagation Society and the Electromagnetic Compatibility (EMC) Society. He actively contributes to these societies as a member of the IEEE MTT-S subcommittee 11 on microwave measurements and as a Board Member and a past Distinguished Lecturer for the EMC Society. He is a Senior Member and serves as Vice President on the Board of Directors for the Antenna Measurements Techniques Association (AMTA) and chaired its annual symposium in 2012. Dennis is a part time faculty member teaching a course on Measurement Science at North Seattle College and is chairman of the Technical Advisory Committee. His current technical interests include aerospace applications of reverberation chamber test techniques as well as microwave measurement systems and uncertainties.

This meeting will also include a tour of NTS.

MEAL INFORMATION

Dinner entrée will feature your choice of Vegetarian or Non-Vegetarian meals.

Members & Student Members: FREE,
Non-members: \$10,
Student non-members: \$5
Presentation & tour only: FREE

Please register online at

<https://events.vtools.ieee.org/m/46648>

or by emailing Diane Sennebogen at diane.brock@utas.utc.com by Thursday, October 26, at 1 pm. Please include the following: name, phone number, email address, and IEEE member number. The meeting is open to the general public.

IEEE RRV Section, Computer & Controls Chapter Meeting
SERVING IEEE MEMBERS OF NORTH CENTRAL ILLINOIS AND SOUTH CENTRAL WISCONSIN

WHEN Thursday, November 16, 2017

WHERE

Northern Illinois University
College of Engineering
 Room: TBD
 590 Garden Rd.
 DeKalb, IL 60115

AGENDA

6:00 PM Networking
 6:30 PM Dinner
 7:15 PM Presentation



Autonomous Distributed Control of the Next-Generation Smart Grid

Dr. Qing-Chang Zhong - Distinguished Lecturer

Professor in Energy and Power Engineering at Department of Electrical and Computer Engineering, Illinois Institute of Technology, Chicago

Power systems are going through a paradigm change from centralized generation, to distributed generation, and further on to smart grids. In order to make power systems more secure, more efficient, more resilient to threats and friendlier to the environment, a huge number of heterogeneous players, including renewable energy sources, electric vehicles, and storage systems etc. on the supply side and different types of smart loads on the demand side, are being connected to power systems to form smart grids. Because of the heterogeneous nature and the huge number of players involved, it is a great challenge to find a system architecture so that all heterogeneous players could work together to maintain system stability and achieve desired performance. In this talk, an autonomous distributed control architecture will be presented from the systems perspective for the next-generation smart grid, after homogenizing the heterogeneous players with the synchronization mechanism of synchronous machines. Two technical routes will be presented to implement this architecture: one is based on the synchronverter technology that makes power converters behave like synchronous machines and the other is based on the robust droop control technology that mimics the external function of synchronous machines. All the distributed controllers require only the information available locally and communicate with each other through the dynamics of power systems, rather than through an additional communication network. They equally and actively take part in the system regulation via independent individual actions to achieve the same control objective, in the same way as conventional power plants do. This holistic solution could considerably enhance the stability, scalability, operability and reliability of the next-generation smart grid.

Dr. Qing-Chang Zhong holds the Max McGraw Endowed Chair Professor in Energy and Power Engineering at Department of Electrical and Computer Engineering, Illinois Institute of Technology, Chicago, USA. He was educated at Imperial College London (PhD, 2004, awarded the Best Doctoral Thesis Prize), Shanghai Jiao Tong University (PhD, 2000), Hunan University (MSc, 1997), and Hunan Institute of Engineering (Diploma, 1990). Having been recognized as a Distinguished Lecturer for the IEEE Control Systems Society, the IEEE Power Electronics Society and the IEEE Power and Energy Society, he is a world-leading multidisciplinary expert in control, power electronics and power systems. Before joining Illinois Institute of Technology, he was the Chair Professor in Control and Systems Engineering at The University of Sheffield, UK, where he built up a \$5M+ research lab dedicated to the control of energy and power systems and attracted the support of Rolls-Royce, National Instruments, Texas Instruments, Siemens, ALSTOM, Turbo Power Systems, Chroma, Yokagawa, OPAL RT and other organizations. He (co-) authored three research monographs, including Robust Control of Time-delay Systems (Springer, 2006) and Control of Power Inverters in Renewable Energy and Smart Grid Integration (Wiley-IEEE Press, 2013). His fourth book on the architecture and technical routes of next-generation smart grids based on the synchronization mechanism of synchronous machines will be published by Wiley-IEEE in 2017. His current research focuses on advanced control/systems theory, power electronics, and the seamless integration of both to address fundamental challenges in energy and power systems.

MEAL INFORMATION

Dinner entrée will feature your choice of Vegetarian or Non-Vegetarian meals.

Members & Student Members: FREE,
 Non-members: \$10,
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 Presentation only: FREE

Please register online at

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or by emailing Diane Sennebogen at diane.brock@utas.uts.com by Thursday, November 16, at 1 pm. Please include the following: name, phone number, email address, and IEEE member number. The meeting is open to the general public.

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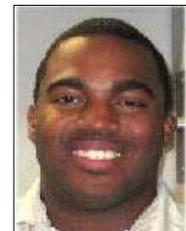
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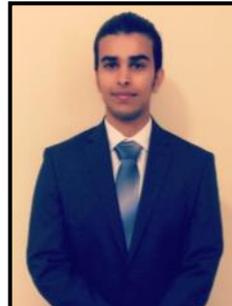
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Rock River Valley Section Chapters

Industry Applications Society Chapter
 Established 1992

Joint Computer/Control Systems Society Chapter
 Established 1995

Power Electronics Society Chapter
 Established 1996

Electromagnetic Compatibility Society Chapter
 Established 2007

The Rock River Valley Section gratefully acknowledges the following companies and colleges for supporting Section Officers:
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Inside This Issue

- October RRVs, Section Meeting1
- November RRVs, EMC Chapter Meeting2
- 2017 RRVs Officer Contact Information3
- RRVs Calendar4