Exponent®
Engineering & Scientific Consulting

Vignesh Rajamani, Ph.D.

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Professional Profile

Dr. Vignesh Rajamani is an expert in the electromagnetic characterization and application of reverberation chambers with Exponent. A main thrust of his research and project experience in the area of reverberation chambers has been towards increasing test accuracy.

Dr. Rajamani's expertise includes statistical electromagnetics, validation and optimization techniques for computational electromagnetics, communication system testing in complex multipath environments, EMI/C Issues with Unmanned Aerial Systems, antenna systems and radio frequency (RF) design, and estimation probability of failure of electronic systems due to electromagnetic interference and compatibility. In his role as a Manager at Exponent, he assists clients with identifying the root cause of the failures of electronic systems and providing guidance on possible solutions, especially in the area of EMI/C.

Dr. Rajamani is the President of the IEEE Electromagnetic Compatibility (EMC) Society and involved with several technical committees and educational activities in the EMC Society.

He served as the Vice President of Member Services for the IEEE Electromagnetic Compatibility (EMC) Society from 2014-2020. He is a Senior Member of IEEE and served as a distinguished lecturer for the IEEE EMC Society for term 2013-2014. He has lectured around the world on reverberation chamber test methodologies and has taught design engineering seminars for faculty and students at many universities focusing on challenges in engineering education and prepare the faculty to handle them by spreading a significant number of Project Based Learning (PBL) classes across the curriculum. Prior to joining Exponent, Vignesh was with Oklahoma State University as a Visiting Assistant Professor where he taught courses in engineering design and performed research in probability of failure of electronic systems in harsh electromagnetic environments. He has also taught the reverberation chamber course at OSU for the past 10 years and served as subject matter expert for various standard bodies.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Oklahoma State University, 2010

M.S., Electrical Engineering, Oklahoma State University, 2005

B.E., Electronics and Communication Engineering, University of Madras, India, 2002

Academic Appointments

Visiting Assistant Professor, Oklahoma State University 2013-2016

Research Engineer, Oklahoma State University, 2011-2013

Post-Doctoral Research Fellow, Oklahoma State University, 2010-2011

Professional Affiliations

Institute of Electrical and Electronics Engineers—IEEE

IEEE Electromagnetic Compatibility Society—IEEE EMCS

IEEE Antennas and Propagation Society—IEEE APS

Publications

Dixon J, Rajamani V, Bunting CF. Performance test of unmanned aerial systems communication links in severe multipath environment. IEEE Symposium on Electromagnetic Compatibility, Ottawa, Canada, 2016.

West JC, Rajamani V, Bunting CF. Frequency- and time-domain measurement of reverberation Chamber Q: An in-silico analysis. IEEE Symposium on Electromagnetic Compatibility, Ottawa, Canada, 2016.

Bakore R, Rajamani V, West JC, Bunting CF. Performance evaluation of feature selective validation in a highly resonant environment. IEEE Symposium on Electromagnetic Compatibility, Ottawa, Canada, 2016.

Rajamani V, Freyer G. Feasibility study of multi-frequency test in a single rotation of mode stirred reverberation chamber. IEEE Symposium on Electromagnetic Compatibility, Dresden, Germany, 2015.

Vyhlidal C, Rajamani V, Bunting CF, Damarchala P, Devabakhtuni V. Estimation of absorber performance using reverberation techniques and artificial neural network models. IEEE Symposium on Electromagnetic Compatibility, Dresden, Germany, 2015.

Drake E, Rajamani V, West JC, Bunting CF, Connor S, Archambeault B. Extension and verification of absorbing material effectiveness on reducing electromagnetic emissions. IEEE Symposium on Electromagnetic Compatibility, Santa Clara, CA, 2015.

Washbourne L, Rajamani V, West JC, Bunting CF, Connor S, Archambeault B. Effectiveness of absorbing materials on reducing electromagnetic emissions from cavities measured using a nested reverberation chamber approach. IEEE Symposium on Electromagnetic Compatibility, Raleigh, NC, 2014.

West JC, Rajamani V, Bunting CF. Simulation of stirred fields within a reverberation chamber using a refined spectral-domain-factorization moment method. IEEE Symposium on Electromagnetic Compatibility, Raleigh, NC, 2014.

Rajamani V, West JC, Bunting CF. Measurement and simulation of the induced current on a wire using S-Parameter Method. IEEE Transactions on Electromagnetic Compatibility, April 2014.

Rajamani V, Bunting CF, West JC. Effect of loading on independent samples and uniformity of a reverberation chamber. IEEE Symposium on Electromagnetic Compatibility, Denver, CO, 2013.

West JC, Rajamani V, Bunting CF. Practical consideration for the evaluation of the 3-D green's function in a rectangular cavity moment method at high frequency. IEEE Symposium on Electromagnetic Compatibility, Denver, CO, 2013.

David L. Green, Rajamani V, Bunting CF, Connor S, Archambeault B. One-port time domain measurement technique for quality factor estimation of loaded and unloaded cavities. IEEE Symposium

on Electromagnetic Compatibility, Denver, CO, 2013.

Devabhaktuni V, Bunting C, Green D, Kvale D, Lakshman Mareddy, Rajamani V. A new ANN based modeling approach for rapid EMI/EMC analysis of PCB and shielding enclosures. IEEE Transactions on Electromagnetic Compatibility, May 2013.

West JC, Rajamani V, Bunting CF. An examination of the accuracy of integral equation based modeling of the fields within a reverberation chamber. Presented at the 29th International review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 24-28, 2013.

Endegena A, West JC, Rajamani V, Bunting CF. Numerical study of currents induced on a partially shielded wire within an ideal reverberation test. IEEE Symposium on Electromagnetic Compatibility, Pittsburgh, PA, 2012.

Rajamani V, Freyer G, Bunting CF. Considerations for performing immunity testing with frequency stirring. IEEE Symposium on Electromagnetic Compatibility, Pittsburgh, PA, 2012.

Rajamani V, Bunting CF, West JC. Difference in quality factor estimation in frequency and time domain. IEEE Asia Pacific Symposium on Electromagnetic Compatibility, Singapore, 2012.

Rajamani V, Bunting CF, West JC. Stirred-mode operation of reverberation chambers for EMC testing. IEEE Transactions on Instrumentation and Measurement, May 2012.

West JC, Bunting CF, Rajamani V. Accurate and efficient numerical simulation of the random environment within a reverberation chamber. IEEE Transactions on Electromagnetic Compatibility, February 2012.

Bunting CF, West JC, Rajamani V. Operational process for characterizing below Decemberk electromagnetic compatibility. Proceedings, 2011 IEEE International RF and Microwave Conference (RFM2011), Seremban, Malaysia, Decemberember 12-14, 2011.

West JC, Bunting CF, Rajamani V. Optimal plane-wave representation of random fields in a reverberation chamber. Proceedings, 2011 IEEE International Symposium on Electromagnetic Compatibility, Long Beach, CA, August 14-19, 2011.

Rajamani V, Freyer G. Impact of statistical parameter options on reverberation chamber test environment. IEEE Symposium on Electromagnetic Compatibility, Long Beach, CA, 2011.

Rajamani V, Bunting CF. On RS testing of highly directive devices. IEEE Symposium on Electromagnetic Compatibility, Ft. Lauderdale, FL, 2010.

Rajamani V, Bunting CF. Determination of reverberation distance using frequency and time domain. IEEE Symposium on Electromagnetic Compatibility, Ft. Lauderdale, FL, 2010.

Rajamani V, Bunting CF, West JC. Calibration of a numerically modeled reverberation chamber. IEEE Symposium on Electromagnetic Compatibility, Austin, TX, 2009.

Rajamani V, Bunting CF. On the performance of wireless systems in moderate/harsh multipath environments. International Conference on Sensors, Security, Software and Intelligent Systems, Coimbatore, India, January 2009.

Rajamani V, Bunting CF, Freyer G. Why consider EMC testing in a reverberation chamber. 10th International Conference on Electromagnetic Interference & Compatibility, Bangalore, India, Novemberember 2008.

Rajamani V, Bunting CF, West JC. Sensitivity analysis of reverberation chambers with respect to tuner

speeds. IEEE Symposium on Electromagnetic Compatibility 2007, Hawaii, USA.

Rajamani V, Bunting CF, Orlandi A, Duffy A. Introduction to feature selective validation. IEEE Symposium on Antennas and Propagation, Albuquerque, NM, 2006.

Rajamani V, Bunting CF, Deshpande MD, Khan ZA. Validation of Modal/MoM in shielding effectiveness studies of metallic enclosures with apertures. IEEE Transactions on Electromagnetic Compatibility, May 2006.

Govardhan JM, Bukkapatnam S, Bhamare Y, Rao P, Rajamani V. Statistical analysis and design of RFID systems for monitoring vehicle ingress/egress in warehouse environments. International Journal for Radio Frequency Identification Technology and Applications (IJRFITA), 2006.

Rajamani V, Bunting CF. Validation of Modal/MoM in shielding effectiveness studies of metallic enclosures with apertures. IEEE Symposium on Electromagnetic Compatibility, Chicago, IL, 2005.

Invited Talks and Presentations

Rajamani V. Importance of electromagnetic compatibility in today's world. Keynote at the International Conference on Microelectronics Electromagnetics and Telecommunication, GITAM University, Vishakhapatnam, India, Decemberember 18, 2015.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Matsuri Engineering College, Hyderabad, India, Decemberember 17, 2015.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Vasavi Engineering College, Hyderabad, India, December 16, 2015.

Rajamani V. EMC test challenges of unmanned aerial systems why drones matter to an EMC test engineer and antenna designer. IEEE EMC Society Seattle Chapter, Seattle, WA,September 28, 2015.

Rajamani V. Rationale for reverberation chamber testing. 13th International Conference on Electromagnetic Interference & Compatibility, Vishakhapatnam, India, July, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Università Politecnica delle Marche, Ancona, Italy IEEE EMC, L'Aquila, Italy, December 9, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. University of L'Aquila, Italy IEEE EMC, L'Aquila, Italy, December 9, 2014.

Rajamani V. Comparison of radiative test facilities. Bangalore Chapter of IEEE EMC Society, Bangalore, November 3, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. IEEE EMC/APS/MTT Joint Chapter, Hyderabad, India, November 1, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. IEEE EMC Society Japan Chapter, Tokyo, Japan, May 15, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. IEEE Shanghai EMC Chapter, Shanghai, China, May 11, 2014.

Rajamani V. Comparison of radiative test facilities. Singapore Chapter of IEEE EMC Society, Singapore, May 9, 2014.

Rajamani V. Comparison of radiative test facilities. IEEE Rock River Valley Section, Rockford, IL, March

27, 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. EMC Chapter of Eastern North Carolina, Raleigh, NC, February 5, 2014.

Rajamani V. Importance of electromagnetic compatibility in today's world. Keynote at the International Conference on Advances in Electrical Engineering, Vellore Institute of Technology (Vellore Campus), Vellore, India, January 2014.

Rajamani V. Importance of electromagnetic compatibility in today's world. International Workshop on Control Commination and Clean Energy, SKP Engineering College, Tiruvannamalai, India, January 2014.

Rajamani V. Engineering design - teaching methodology. Workshop at the International Conference on Advances in Electrical Engineering Vellore Institute of Technology (Vellore Campus), Vellore, India, January 2014.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. EMC Chapter of Chicago, IL October 23, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. EMC Chapter of New Jersey, Hazlet, NJ, Sep 25, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. EMC Chapter of Germany, HanNovemberer, Germany, Sep 12, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. BeNeLux EMC Chapter, Amsterdam, Nederland, September 10, 2013.

Rajamani V. Connectors and cable assemblies shielding effectiveness measurements using reverberation chambers. The TechAmerica G46 Committee on Electromagnetic Compatibility, 2013 IEEE International Symposium on EMC, Denver, CO, 2013.

Rajamani V. Importance of engineering design. Vellore Institute of Technology (Vellore Campus), Vellore, India, July 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Madras EMC Chapter in Chennai, India, July 12, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Santa Clara EMC Chapter in Santa Clara, CA, May 14, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. Ottawa EMC Chapter in Ottawa, Canada, April 17, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. West Michigan EMC Chapter in Grand Rapids, MI, March 22, 2013.

Rajamani V. A practitioners approach to EMC testing using reverberation chambers. EMC Chapter of Southeastern Michigan (Detroit) Section, March 21, 2013.

Rajamani V. Teaching engineering design. Vellore Institute of Technology (Chennai Campus), Chennai, India, January 2013.

Rajamani V, Bunting CF, Gustav J. Freyer. Rationale for reverberation chamber testing. National Radio Science Meeting, Boulder, CO, January 9-12, 2013.

Rajamani V. Electromagnetic interference and compatibility. IEEE and HKN student chapter meeting, Oklahoma State University, 2012.

Rajamani V. Computational electromagnetic simulation of reverberation chambers. EMSS USA, Hampton, VA, August 2007.

Rajamani V. Reverberation chambers: Statistically deterministic chaos. IEEE EMC Chapter Raleigh, NC, August 2007.

Rajamani V, Freyer G, Bunting CF. Some thoughts on independent samples. Reverberation chambers, Open Area Test Site and Anechoic Chambers Users Group Meeting, Sandusky, OH, June 2009.

Project Experience

Converted a NASA thermal chamber into an EMC test facility that will be used for the next-generation space vehicle tests. Designed the tuner and calibrated chamber for tests.

Developed models and techniques that helped designers to analyze electromagnetic environments and discern the probability of failure more accurately and quickly—this model is being used in the small business technology transfer projects with U.S. Navy and U.S. Airforce.

Developed method for optimizing the amount and placement of absorber on products to reduce electromagnetic emissions while minimizing added weight. Subsequently helped create scalability to larger products.

Created model of electromagnetic environments that simplifies design problems and allows faster simulations for aircraft, consumer electronics, and communication systems.

Led research on validation methods, which enable certification of avionics, consumer, and communication products early in the design process.

Allowed electronics manufacturers to determine optimal power levels and eliminate needs for costly equipment by developing rapid way to measure the quality factor of cavities in products that range from computer cases to wireless equipment.