EM-ANNs for Computer Aided Modeling and Optimization: From Theory to Practice

Dr. Vijay Kumar Devabhaktuni
Professor,
Department of Electrical Engineering and Computer Science,
University of Toledo

Date: Sept. 22, 2014 Time: 11:00 am to 11:50 am Place: SSOE Seminar Room NI-1027

Abstract:

Computer aided design (CAD) lies at the heart of electronics industry. For instance, wireless markets that rely on CAD tools reached $22 billion in 2003 and are growing at 15% per year. Recent drive in the microelectronics and RF/microwave industries toward GHz frequencies demands efficient and powerful computer aided modeling, simulation, and optimization tools. Circuits operating at GHz frequencies emulate full-wave electromagnetic (EM) behaviors. Although traditional CAD tools allow virtual design of high-frequency circuits (e.g. RFICs), the resulting designs may not work, because high-frequency libraries of such tools typically lack EM flavors. The talk will cover educational, fundamental concepts of artificial neural networks (ANNs) based high-frequency modeling techniques striving for judicious use of CPU-expensive EM data. From an industry perspective, approaches to smart integration of high-frequency models into CAD-tool libraries will be briefly described. Several examples in EMC/EMI and RF/microwave domains will also be covered. Should the time permit, the talk will highlight the speaker’s recent transition into interdisciplinary arenas including biomedical engineering, enhancing the access to radio spectrum, structural health monitoring (SHM), and national defense. Finally, the forum will be opened for discussions and questions.

Speaker Biography:

Vijay Devabhaktuni received the B.Eng. degree in EEE and the M.Sc. degree in Physics both from BITS, India, in 1996, and the Ph.D. in Electronics from Carleton University, Canada, in 2003. He held the 2005-2008 Canada Research Chair in Computer-Aided High-Frequency Modeling and Design at Concordia University, Montreal, Canada. He is currently Full Professor in the EECS Department at the University of Toledo. His R&D interests include applied electromagnetics, biomedical applications, computer aided design, device modeling, infrastructure monitoring, neural networks, optimization, RF/microwave devices, and virtual reality. In these areas, Dr. Devabhaktuni secured funding of about $5M from government and industry, authored 175+ peer-reviewed papers, and is advising 15+ MS and PhD students and 1 Research Assistant Professor. He has won multiple teaching excellence awards. Since 2012, he is serving as a Director of Interdisciplinary Research Initiatives for the College of Engineering.