

## OVERVIEW OF ANTENNA THEORY AND ANALYSIS

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Welcome to the 2011 IEEE International Courses for Wireless Technology Professionals – *Overview of Antenna Theory and Analysis*, jointly organized by Wireless Communication Laboratory of Faculty of Science and Technology of University of Macau and IEEE Macau AP/MTT Joint Chapter. This course collects the 40-year experiences of Dr. Sarkar in the area of antenna analysis. It aims to provide an intensive training to the participants about antenna, from the basic theory to the analysis methods, particularly includes the practical application of the latest 3D electromagnetic field simulation software in this topic. The course is organized in the following two parts:

### *Part 1: Basic Antenna Theory and Parameters*

- a. Participants will become familiar with basic antenna characteristics, theory, concepts and principles, including gain and pattern and the difference between near and far fields. Participants will be able to explain the meaning of power density and specific absorption rate (SAR). Participants will be able to describe the following terms: Frequency, Wavelength, Plane Waves, Electric Field, Magnetic Field.
- b. Participants will be able to use transmitting antenna parameters, including Pattern and Beam Width, Gain, ERP and EIRP, Bandwidth.
- c. Participants will be able to use receiving antenna parameters, including Effective Area or Aperture and Antenna Factor.
- d. Participants will be able to identify various types of antennas and applications, including linear, folded, and shaped half-wavelength dipoles, shunt- and series-fed monopoles, slots, helices, horns, aperture antennas, and arrays of similar elements used for broadcast, wireless, and microwave communication.

### *Part 2: Computer Modeling*

- e. Participants will view demonstrations of antenna analysis by a commercial electromagnetic simulation software - HOBBIES. Participants will have gained, through the demonstration, a basic understanding of how to use the software, and will be able to design simple antenna and absorber models to calculate/display results including gain, pattern, near fields and SAR.

**Date:** *March 21, 22, and 23*

**Time:** *2:30 p.m. to 5:30 p.m.*

**Venue:** *Auditorium of Science and Technology Development Fund, Macao SAR, China*

Organizers:



Supporting organization:



Sponsor:



**About the lecturer:**

**Tapan K. Sarkar** received the B.Tech. degree from the Indian Institute of Technology, Kharagpur, in 1969, the M.Sc.E. degree from the University of New Brunswick, Fredericton, NB, Canada, in 1971, and the M.S. and Ph.D. degrees from Syracuse University, Syracuse, NY, in 1975.

From 1975 to 1976, he was with the TACO Division of the General Instruments Corporation. He was with the Rochester Institute of Technology, Rochester, NY, from 1976 to 1985. He was a Research Fellow at the Gordon McKay Laboratory, Harvard University, Cambridge, MA, from 1977 to 1978. He is now a Professor in the Department of Electrical and Computer Engineering, Syracuse University. His current research interests deal with numerical solutions of operator equations arising in electromagnetics and signal processing with application to system design. He obtained one of the “best solution” awards in May 1977 at the Rome Air Development Center (RADC) Spectral Estimation Workshop. He received the Best Paper Award of the IEEE Transactions on Electromagnetic Compatibility in 1979 and in the 1997 National Radar Conference. He has authored or coauthored more than 300 journal articles and numerous conference papers and 32 chapters in books and fifteen books, including his most recent ones:

- *Iterative and Self Adaptive Finite-Elements in Electromagnetic Modeling* (Boston, MA: Artech House, 1998),
- *Wavelet Applications in Electromagnetics and Signal Processing* (Boston, MA: Artech House, 2002),
- *Smart Antennas* (IEEE Press and John Wiley & Sons, 2003), *History of Wireless* (IEEE Press and John Wiley & Sons, 2005),
- *Physics of Multiantenna Systems and Broadband Adaptive Processing* (John Wiley & Sons, 2007),
- *Parallel Solution of Integral Equation-Based EM Problems in the Frequency Domain* (IEEE Press and John Wiley & Sons, 2009), and
- *Time and Frequency Domain Solutions of EM Problems using Integral Equations and a Hybrid Methodology* (IEEE Press and John Wiley & Sons, 2010)

Dr. Sarkar is a Registered Professional Engineer in the State of New York. He received the College of Engineering Research Award in 1996 and the Chancellor’s Citation for Excellence in Research in 1998 at Syracuse University. He was an Associate Editor for feature articles of the IEEE Antennas and Propagation Society Newsletter (1986-1988), Associate Editor for the IEEE Transactions on Electromagnetic Compatibility (1986-1989), Chairman of the Inter-commission Working Group of International URSI on Time Domain Metrology (1990-1996), Distinguished Lecturer for the Antennas and Propagation Society from (2000-2003), Member of Antennas and Propagation Society ADCOM (2004-2007), on the board of directors of ACES (2000-2006), vice president of the Applied Computational Electromagnetics Society (ACES), and a member of the IEEE Electromagnetics Award board (2004-2007). He is currently an associate editor for the IEEE Transactions on Antennas and Propagation. He is also on the editorial board of Digital Signal Processing – A Review Journal, Journal of Electromagnetic Waves and Applications and Microwave and Optical Technology Letters. He is the chair of the International Conference Technical Committee of IEEE Microwave Theory and Techniques Society # 1 on Field Theory and Guided Waves. He is a member of Sigma Xi and International Union of Radio Science Commissions A and B.

He is also the president of OHRN Enterprises, Inc., a small business incorporated in New York state (1985) performing various research work for various organizations in system analysis.

He received Docteur Honoris Causa both from Universite Blaise Pascal, Clermont Ferrand, France in 1998 and from Politechnic University of Madrid, Madrid, Spain in 2004. He received the medal of the friend of the city of Clermont Ferrand, France, in 2000.

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