

The IEEE Antennas & Propagation/Microwave Theory & Techniques Chicago Chapter and the ECE Dept. of the University of Illinois at Chicago present a Distinguished Lecture on

## **METAMATERIALS FOR MINIATURIZATION OF NARROWBAND AND ULTRA-WIDEBAND ANTENNAS**

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Thursday June 22, 2006  
5:30 pm: Refreshments  
6:00 pm: Distinguished Lecture

University of Illinois at Chicago  
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Room 1043 Engineering Research Facility  
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Chicago, IL 60607

It is well-recognized that materials design holds a promise in developing novel antennas that are much smaller and enable greater multi-functionality than ever before. Such needs stem from the unprecedented growth of commercial wireless communications and related research is highly fueled by growth in commercial and defense multi-band and high bandwidth future communication systems. This presentation will discuss how modified materials, inductive/capacitive lumped loads and low loss magnetic materials/crystals (metamaterials) are impacting antenna design with the goal of overcoming miniaturization challenges (viz. bandwidth and gain reduction, multi-functionality etc.). Dielectric design and texturing for impedance matching has, for example, led to significant size reduction and higher bandwidth low frequency antennas. Also, recent magnetic photonic crystals (MPCs) and non-magnetic versions of these crystals hold a promise for antenna/array miniaturization. Formal design methods incorporating local, global or hybrid optimizers play an important role in materials design. Such algorithms and their role in antenna and other radio frequency (RF) applications will play a critical role in materials design. Practical realizations of these new materials are poised to challenge computational and design methods for a variety of RF applications.

## Biography

John L. Volakis was born on May 13, 1956 in Chios, Greece and immigrated to the U.S.A. in 1973. He obtained his B.E. Degree, summa cum laude, in 1978 from Youngstown State Univ., Youngstown, Ohio, the M.Sc. in 1979 from Ohio State University, Columbus, Ohio and the Ph.D. degree in 1982, also from the Ohio State Univ. From 1982-1984 he was with Rockwell International, Aircraft Division (now Boeing Phantom Works), Lakewood, CA and during 1978-1982 he was a Graduate Research Associate at the Ohio State University ElectroScience Laboratory. From January 2003 he is the Roy and Lois Chope Chair Professor of Engineering at the Ohio State University, Columbus, Ohio and also serves as the Director of the ElectroScience Laboratory. Prior to moving to the Ohio State Univ, he was a Professor in the Electrical Engineering and Computer Science Dept. at the University of Michigan, Ann Arbor, MI. since 1984 (19 years). He also served as the Director of the Radiation Laboratory from 1998 to 2000. His primary research deals with computational methods, electromagnetic compatibility and interference, design of new RF materials, multi-physics engineering and bioelectromagnetics. Dr. Volakis published about 220 articles in major refereed journal articles (9 of these have appeared in reprint volumes), more than 250 conference papers and 10 book chapters. In addition, he co-authored two books: *Approximate Boundary Conditions in Electromagnetics* (Institution of Electrical Engineers, London,1995) and *Finite Element Method for Electromagnetics* (IEEE Press, New York, 1998). He has also written two well-edited coursepacks on introductory and advanced numerical methods for electromagnetics, and has delivered short courses on numerical methods, antennas and frequency selective surfaces. In 1998 he received the University of Michigan (UM) College of Engineering Research Excellence award and in 2001 he received the UM, Dept. of Electrical Engineering and Computer Science Service Excellence Award. Dr. Volakis is listed by ISI among the top 250 most referenced authors (2004); He graduated/mentored nearly 40 Ph.D. students/post-docs, and co-authored with them 4 best paper awards at conferences. Dr. Volakis served as an Associate Editor of the IEEE Transactions on Antennas and Propagation from 1988-1992, and as an Associate Editor of Radio Science from 1994-97. He chaired the 1993 IEEE Antennas and Propagation Society Symposium and Radio Science Meeting, and co-chaired the same Symposium in 2003. Dr. Volakis was a member of the AdCom for the IEEE Antennas and Propagation Society from 1995 to 1998 and serves as the 2004 President of the IEEE Antennas and Propagation Society. He also serves as an associate editor for the J. Electromagnetic Waves and Applications, the IEEE Antennas and Propagation Society Magazine, and the URSI Bulletin. He is a Fellow of the IEEE, and a member of Sigma Xi, Tau Beta Pi, Phi Kappa Phi, and Commission B of URSI. He is also listed in several Who's Who directories, including Who's Who in America.