

Department of Electrical and Computer Engineering

Title: « Computational Methods in Electromagnetics with Applications »

Dr. Anastasis C. Polycarpou
Professor and Head of the Department of Electrical & Computer Engineering
at the University of Nicosia

Wednesday, 10th December 2014, 17:00 – 18:30
Room ΠΤΕΡ E116, Old Campus
University of Cyprus

Abstract:

With the explosion of technology after World War II, there appeared a constant need for system design, component optimization, and fabrication of prototypes. These three engineering tasks often took place in a laboratory environment requiring technical skills, time, persistence, and a lot of trials and error. It used to be a long, tedious and tiring process before one reached a working prototype. With the advance of computers in the early 80's, things have changed. Computers allowed the development of powerful numerical methods that can accurately model physical phenomena such as electromagnetic propagation, radiation, or scattering from complex media and structures. This has provided scientists with a powerful tool which can be used effectively in the design and optimization of systems; i.e., a Smartphone Wi-Fi antenna or a SATCOM antenna placed on the fuselage of an airbus. Before the appearance of computers in the early 80's, scientists were using analytical and asymptotic methods to model electromagnetic behavior treating only canonical and coordinate conformal structures. Such techniques included Mode-Matching techniques, the Physical Optics, the Physical Theory of Diffraction, the Geometrical Theory of Diffraction, and closed-form analytical derivations. With the appearance of computers, scientists developed powerful discretization methods some of which include the Method of Moments (MoM), the Finite Element Method (FEM), and the Finite-Difference Time-Domain (FDTD) method. The focus of this presentation will be primarily on the development of the FEM and its formulation for the solution of scattering and radiation problems. The presentation is targeted for undergraduate students close to graduation or graduate students in their Master's or early PhD.

Biography:

Dr. A. C. Polycarpou graduated from Arizona State University in 1992 earning a BSEE degree in Electrical Engineering (EE) with Summa Cum Laude. He continued his graduate studies at the same university, under the supervision of Prof. C. A. Balanis, where he received an MSc degree in 1994 and a PhD degree in 1998. He is now a Professor and Head of the Department of Electrical & Computer Engineering at the University of Nicosia in Cyprus. He has an extensive experience in funded research projects related to antenna analysis and design, microwave circuits and high-frequency electronic packaging, finite element/boundary integral methods in Electromagnetics, mode-matching and analytical methods, modeling of liquid crystals and non-linear optics, and radio frequency identification (RFID) systems. He has acted as a research group leader for projects that were funded by a number of private companies and organizations in the USA including Boeing, Sikorsky, Rockwell, NASA, US Navy/Army, etc. He also acted as a consultant to a number of companies (e.g., Kyocera America, etc.). He has also coordinated and/or participated in a number of project funded by CyRPF and the Europe Union (EU). He is the author of a book and two chapters in books as well as a co-author approximately 100 papers in refereed journals and conference proceedings. Prof. Polycarpou is a Senior Member of the IEEE and a member of IEEE society on Antennas and Propagation and IEEE society on Microwave Theory and Techniques. He is currently an Associate Editor of the IET Microwaves, Antennas & Propagation and a national delegate of Cyprus for COST IC1102 (VISTA). He is also an active member of EurAAP.