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**EDUCATION:**

**DOCTOR OF PHILOSOPHY**, Electrical Engineering. currently  
**The Ohio State University**, Columbus, Ohio - G.P.A. 3.95/4.0  
Diss. title: *Domain Decomposition Methods for Large Electromagnetic Problems*  
Advisor: Prof. Jin-Fa Lee

**MASTER OF SCIENCE** in Electrical Engineering, December 2001.  
**Arizona State University**, Tempe, Arizona.  
G.P.A. 4.0/4.0  
Thesis title: *Analysis of Ferrite-Loaded Cavity-Backed Antennas Using a Hybrid Finite Element Method*  
Advisor: Prof. Constantine A. Balanis

**DIPLOMA** in Electrical Engineering (*5 years degree*), July 1999.  
**Democritus University of Thrace**, Xanthi, Greece.  
G.P.A. 8.1/10.0, graduated *first* in a class of 80 students.  
Thesis title: *Electromagnetic Simulation of Waveguide Structures Using the Finite Element Method*  
Advisor: Prof. George A. Kyriacou

**WORK EXPERIENCE:**

6/98 to 9/98    *ENGINEERING INTERN*  
**ANCO S.A.**, Athens, Greece.  
Telecommunications Division.  
Worked on a project related to high-speed optical networks (SDH/SONET).

**RESEARCH EXPERIENCE:**

07/02 to present    *ANSOFT CORPORATION FELLOW*  
**ElectroScience Laboratory**, The Ohio State University, Columbus, Ohio.  
Worked on various research topics some of which include the following:

- Development and implementation of a novel *Fast Finite Element Tearing and Interconnecting Like Domain Decomposition Method*, for finite arrays, photonic and electromagnetic band gap structures, metamaterials and frequency selective surfaces.
- Analysis and development of a *Domain Decomposition Method, based on a generalized Robin transmission condition, for non-conforming finite element methods*. The codes resulted from this work were applied to the analysis of large finite arrays.
- Formulation and development of a new symmetric coupling of the *Finite Element and Integral Equation* for the solution of unbounded three-dimensional electromagnetic problems.

01/02 to 07/02    *GRADUATE RESEARCH ASSOCIATE*  
**ElectroScience Laboratory**, The Ohio State University, Columbus, Ohio.  
Worked on various research topics some of which include the following:

- Formulation and development of several coupled *Finite Element* and *Integral Equation* approaches for the solution of unbounded three-dimensional electromagnetic problems.
- Study and become familiar with the basic ideas of domain decomposition methods.

8/99 to 12/01

*GRADUATE RESEARCH ASSISTANT*

**Telecommunications Research Center**, Arizona State University, Tempe, Arizona.

Worked on various research topics some of which include the following:

- Development of three-dimensional *Finite Element* formulations for the solution of the time-harmonic Maxwell's equations for analysis of waveguide discontinuity problems (ferrite circulators).
- Development of three-dimensional *Finite Element* formulations for the solution of the Laplace's equation for analysis of nonlinear magnetostatic problems.
- Development of a hybrid *Finite Element Method* and *Spectral Domain Method of Moments* for analysis and design of arbitrary shape Cavity-Backed Slots (CBS) with multilayer overlays and ferrite loadings. The hybrid high-frequency method was combined with the nonlinear magnetostatic FEM solution to study the effects of the nonuniform magnetization of the ferrite samples.
- Analysis of antennas mounted on helicopter airframes.

9/97 to 7/99

*SENIOR UNDERGRADUATE STUDENT*

**Microwaves Lab.**, Democritus University of Thrace, Xanthi, Greece.

Worked on the development of two-dimensional *Finite Element* formulations for electromagnetic analysis of closed and open waveguide problems (eigenvalue problem).

## HONORS AND AWARDS:

- 3/04 Organize with Prof. Richard K. Gordon, and chair the technical session “*PDE Methods for Solving Electromagnetic Problems*” at the *PIERS 2004*, Pisa, Italy.
- 7/01 Co-chair of the technical session “*Antenna Theory*” at the *IEEE Antennas and Propagation Society International Symposium*, Boston, MA.
- 5/01 to present Technical reviewer of the *IEEE Transactions on Microwave Theory and Techniques*.
- 7/99 Graduated *second* in the entire Polytechnic School of Democritus University of Thrace (graduating class of approximately 150 students).
- 8/98 to 6/99 Technical Chamber of Greece Award for Excellent Engineering Students.
- 8/97 to 6/99 Hellenic National Fellowship Foundation Award for Academic Excellence.

## WRITING/PRESENTATION SKILLS:

- Wrote sections in several progress reports for funded projects by government and private agencies including the Army Research Office (ARO), US Navy, NASA, Boeing, Rockwell, Sikorsky, etc.
- Presented research material at international conference and local meetings with sponsors.

## COMPUTER EXPERIENCE:

- Very good knowledge of UNIX platforms including SGI and HP workstations. Very good knowledge of PC's (Windows 2000/NT/98/95 and LINUX).
- Programming Languages: C++, C, Java, Fortran 77/90.
- Mathematical Tools: MATLAB and MAPLE V.
- EM/CAD Software Packages: Ansoft *HFSS*, Ansoft *Ensemble*, *NEC*, *SDRC I-DEAS*, *HP MDS/ADS*.
- Typesetting/Word Processors:  $\text{\LaTeX}$ , *Microsoft Word*.

## COURSEWORK:

### DOCTOR OF PHILOSOPHY

EE 700 Digital Signal Processing	EE 720 Mixed-Signals VLSI
EE 815 Advanced Antenna Theory	MAT 603 Mathematical Principles for Scientists
EE 817 Advanced Electromagnetic Theory 1	CIS 694J Object Oriented Programming with Java
EE 818 Advanced Electromagnetic Theory 2	EE 894P Advanced Integral Equations
EE 819 Advanced Electromagnetic Theory 3	EE 620 RF Circuits
CIS 621 Intro. to High-Performance Computing	

### MASTER'S

Electromagnetic Fields and Guided Waves	Advanced Electromagnetic Field Theory
Antennas for Wireless Communications	Antenna Design
Numerical Analysis	Applied Complex Analysis
Computational Methods in Electromagnetics	Microwave Circuit Design

### UNDERGRADUATE (selected)

Telecommunications Systems I and II	RF Systems Design
Fiber Optics	Electromagnetic Fields Measurements
Cellular Telephony	Electromagnetic Compatibility
Antennas	Radar Systems
Microwaves	Transmission Lines and Wave Propagation
Electromagnetic Fields I, II and III	Advanced Topics in Electromagnetic Theory
Numerical Analysis	Linear Algebra
Partial Differential Equations	Complex Analysis
Probability Theory	Graph Theory

**MEMBERSHIPS:**

9/99 to present *Student Member* of the IEEE, (AP-S, EMC-S, MTT-S).

**HOBBIES:**

Literature, History, Music.

**REFERENCES:**

Available upon request.

## JOURNAL PUBLICATIONS:

M. N. Vouvakis, S.-C. Lee, K. Zhao and J.-F. Lee, "A symmetric FEM-IE Formulation with a Single-Level IE-QR Algorithm for Solving Electromagnetic Radiation and Scattering Problems", *IEEE Transactions on Antennas and Propagation*, accepted for publication.

M. N. Vouvakis, A. C. Polycarpou and C. A. Balanis, "Cavity-Backed Antennas with Multilayer Superstrates", *IEEE Transactions on Antennas and Propagation*, Vol. 52, No. 5, May 2004/

M. N. Vouvakis, C. A. Balanis, C. R. Birtcher and A. C. Polycarpou, "Ferrite-Loaded Cavity-Backed Antennas Including Nonlinear and Nonuniform Magnetization Effects", *IEEE Transactions on Antennas and Propagation*, Vol. 51, No. 5, pp. 1000-1010, May. 2003.

C. A. Balanis, A. C. Polycarpou, M. N. Vouvakis, and C. R. Birtcher, "Hybridization of a boundary element method with the finite element method in electromagnetics", *Boundary Elements XXII*, Advances in Boundary Elements Vol. 10, pp.195-204, May 2001.

## CONFERENCE PUBLICATIONS:

K. Zhao, M. N. Vouvakis, S.-C. Lee, and J.-F. Lee, "An Ultimate DDM with Mortar Techniques for Solving Large EM Problems – 1 billion Unknowns on a PC", *PIERS 2004*, Pisa, Italy, submitted.

S.-C. Lee, M. N. Vouvakis, and J.-F. Lee, "An Efficient Non-Conforming Finite element Domain Decomposition Method for the analysis of Large Finite Arrays", *PIERS 2004*, Pisa, Italy, submitted.

M. N. Vouvakis, S.-C. Lee, K. Zhao, and J.-F. Lee, "A Symmetric FEM-IE Formulation using a Single Level IE-QR Algorithm", (*Invited paper*), in *Proceedings of the International Conference on Electromagnetics in Advanced Applications*, Torino, Italy, Vol. 1, pp. 111-114, Sept, 2003.

M. N. Vouvakis, S.-C. Lee, K. Zhao, and J.-F. Lee, "Hybrid FEM/IE Formulation using a Single Level QR Algorithm", EMCC 2003, NASA Langley Research Center, Hampton Virginia, May 20-22, 2003.

M. N. Vouvakis, S.-C. Lee, K. Zhao, and J.-F. Lee, "Speed up the hybrid FEM+IE formulation using a low-rank matrix approximation", (*Invited paper*), *IEEE Antennas Propagat. Society Internat. Symp. Digest*, Columbus, OH, Vol. 2, pp. 124-127, July, 2003.

M. N. Vouvakis, S.-C. Lee, K. Zhao, and J.-F. Lee, "Hybrid FEM/IE Formulation using a Single-Level Low-Rank IE-QR Algorithm", (*Invited paper*), Mathematics of Finite Elements and Applications (MAFELAP), Brunel Institute of Computational Mathematics, UK, pp. 109, June 21-24, 2003.

M. N. Vouvakis, S.-C. Lee, and J.-F. Lee, "A Non-Overlap Schwarz Method, Hybrid FEM/IE Formulation, for Solving Unbounded EM Problems", *PIERS 2003*, Singapore, Jan 7-10, 2003.

M. N. Vouvakis, C. A. Balanis and C. R. Birtcher, "Nonuniform and Nonlinear Magnetization for Cavity-Backed Ferrite-Loaded Antennas," 6th International Workshop on Finite Elements for Microwave Engineering, Chios, Greece, pp. 12, May 30-June 1, 2002.

M. A. Gkatzianas, C. R. Birtcher, C.A. Balanis and M.N. Vouvakis "A new FDTD thin-slot equivalent circuit algorithm", *IEEE Antennas Propagat. Society Internat. Symp. Digest*, San Antonio, TX, Vol. 3, pp. 616-619, June, 2002.

M.N. Vouvakis, A.C. Polycarpou and C.A. Balanis, "Analysis of Ferrite-Loaded Cavity-Backed Antennas Including Nonlinear and Nonuniform Magnetization Effects", *IEEE Antennas Propagat. Society Internat. Symp. Digest*, Boston, MA, Vol. 4, pp. 190-193, July, 2001.

M. N. Vouvakis, A.C. Polycarpou and C.A. Balanis, "Cavity-Backed Antennas with Multilayer Superstrates", *IEEE Antennas Propagat. Society Internat. Symp. Digest*, Boston, MA, Vol. 4, pp. 186-189, July, 2001.