

## In the Name of God

### **Mohsen Ghaffari-Miab**

Assistant Professor

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### **EDUCATION**

**Visiting Research Scholar:** *University of Michigan*, Summer 2010- Summer 2011.

on Time-Domain Integral Equation Methods

Advisor: Dr. Eric Michielssen

**Postdoctoral Fellow:** *University of Tehran*, Summer 2012 – Summer 2013.

on Analysis of Microwave Integrated Circuits Using Time-Domain Integral Equation Methods

Advisor: Dr. Reza Faraji-Dana

**Ph.D.:** *University of Tehran*, Fall 2007 – Summer 2012, **GPA: 19.3/20**

Communication Engineering, Fields and Waves

Thesis: *Time Domain Analysis of Microwave Integrated Circuits Using Complex-Time Green's Functions.*

Advisor: Dr. Reza Faraji-Dana

**Ph.D. Thesis Grade: Excellent**

**M.Sc.:** *University of Tehran*, Fall 2005 – Summer 2007, **GPA: 18.5/20**

Communication Engineering, Fields and Waves

Thesis: *Time Domain Analysis of Wire Antennas and Microstrip Lines Using Complex-Time Green's Functions.*

Advisor: Dr. Reza Faraji-Dana

**M.Sc. Thesis Grade: 20/20**

**B.Sc.:** *University of Tehran*, Fall 2001 – Summer 2005, **GPA: 17.4/20**

Electrical Engineering, Communication

Project: *Radiation of a Current Element in the Presence of Left-Handed Materials.*

Advisor: Dr. Mahmoud Shahabadi

**B.Sc. Project Grade: 20/20**

**Pre-university Certificate**, 2001, Shahid Motahhari College, Tehran, Iran, **GPA: 19.3/20**

**High School Diploma**, 2000, Alborz High School, **GPA: 19.1/20**

### **HONORS**

**2007** Ranked 1<sup>st</sup> in Tehran university Ph.D. program contest on Communication Engineering.

**2005** Ranked 1<sup>st</sup> in nation-wide Azad university M.Sc. program contest on Medical Rays.

**2001** Ranked 196<sup>th</sup> among more than 360'000 participants in the nation-wide universities undergraduate entrance exam.

**1997** Ranked 2<sup>nd</sup> in the first National Mathematics Olympiad among all students of Tehran guidance schools.

## **RESEARCH INTERESTS**

- **Computational Electromagnetics**
  - *Integral Equation (IE)- Based Methods*
  - *Development of Powerful in-House Software Packages Using Parallel Programming Techniques*
  - *Fast IE Solvers in both Frequency- and Time-Domain (MoM, TD-MoM, AIM, TD-AIM, MLFMM, PWTD, Preconditioners, ...)*
  - *CPU and GPU-based Parallel Computation for Multi-scale EM Simulations*
  - *High-Frequency Techniques (PO, PTD, GTD, UTD, Ray Tracing, ...)*
  - *Hybrid Methods*
- **Analysis of Planar Microwave and Millimeter-wave Circuits**
  - *Multilayered Green's Functions (GFs)*
  - *Sommerfeld Integrals*
  - *Time-Domain Green's Functions (TDGFs) of Layered Media*
  - *Complex-Time Green's Function*
  - *Hybrid Complex-Time and Finite-Difference Generated TDGFs of Stratified Media*
- **Dyadic Green's Functions of EM structures**
- **Scattering and Inverse Scattering**
  - *EM Scattering from Objects with Arbitrary Geometries*
- **Basic Theorems and Concepts in Electromagnetics**
- **Microwave and Millimeter-wave Passive and Active Components and Circuits**
- **Antenna Design and Measurement**
  - *Wideband Antenna Design*
  - *Antenna Measurement Techniques*
- **Metamaterials**
- **Optics and Photonics**

## **PUBLICATIONS**

### **Journal papers**

- [1] B. Janjan, D. Fathi, M. Miri, and M. Ghaffari-Miab, "Ultra-wideband high-speed Mach-Zehnder switch based on hybrid plasmonic waveguides," *Applied Optics*, vol. 56, pp. 1717-1723, 2017.
- [2] K. Masumnia-Bisheh, M. Ghaffari-Miab, and B. Zakeri. "Evaluation of Different Approximations for Correlation Coefficients in Stochastic FDTD to Estimate SAR Variance in a Human Head Model," *IEEE Transactions on Electromagnetic Compatibility*, vol. 59, no. 2, pp. 509-517, 2017.
- [3] M. Ahmadi, K. Forooghi, R. Faraji-Dana, and M. Ghaffari-Miab, "Two-Dimensional Sub-diffraction-limited Imaging by an Optimized Multilayer Superlens," *Journal of the Optical Society of Korea*, vol. 20, pp. 653-662, 2016.
- [4] M. Ghaffari-Miab, F. Valdes, R. Faraji-Dana, and E. Michielssen, "Time-Domain Integral Equation Solver for Planar Circuits over Layered Media Using Finite Difference Generated Green's Functions," *IEEE Transactions on Antennas and Propagation*, vol. 62, no. 6, pp. 3076-3090, 2014.
- [5] M. Ghaffari-Miab, F. Valdes, R. Faraji-Dana, and E. Michielssen, "Time-Domain Integral Equation Solver Using Variable-Order Temporal Interpolators," *Applied Computational Electromagnetics Society (ACES) Journal*, vol. 29, no. 2, pp. 116-123, 2014.
- [6] F. Valdes, M. Ghaffari-Miab, F. P. Andriulli, K. Cools, and E. Michielssen, "High-order Calderon Preconditioned Time Domain Integral Equation Solvers," *IEEE Transactions on Antennas and Propagation*, vol. 61, pp. 2570-2588, 2013.

- [7] M. Ghaffari-Miab, Z. H. Firouzeh, R. Faraji-Dana, R. Moini, S. H. H. Sadeghi, and G. A. E. Vandenbosch, "Time-domain MoM for the analysis of thin-wire structures above half-space media using complex-time Green's functions and band-limited quadratic B-spline temporal basis functions," *Engineering Analysis with Boundary Elements*, vol. 36, pp. 1116-1124, 2012.
- [8] M. H. Haddad, M. Ghaffari-Miab, and R. Faraji-Dana, "Transient analysis of thin-wire structures above a multilayer medium using complex-time Green's functions," *Microwaves, Antennas & Propagation, IET*, vol. 4, pp. 1937-1947, 2010.
- [9] M. Ghaffari-Miab, A. Farmahini-Farahani, R. Faraji-Dana, and C. Lucas, "An efficient hybrid swarm intelligence-gradient optimization method for complex time Green's functions of multilayer media," *Progress in Electromagnetics Research, PIER*, vol. 77, pp. 181-192, 2007.

#### **Conference Papers and Abstracts**

- [10] S. R. Miri-Rostami, "Fast computation of finite difference generated time-domain Green's functions of layered media using OpenAcc on graphics processors", in *25th Iranian Conference on Electrical Engineering (ICEE)*, Tehran, Iran, 2017, pp. 1-4.
- [11] M. Gholizadeh, M. Ghaffari-Miab, "Analytical Solution of the Electric Field of a Line Source Embedded in a Cylindrical  $\mu$  and Epsilon Near Zero Metamaterial," in *25th Iranian Conference on Electrical Engineering (ICEE)*, Tehran, Iran, 2017, pp. 1-4.
- [12] M. Ghaffari-Miab, R. Faraji-Dana, and E. Michielssen, "Time-Domain Green's Functions of Layered Media Using Modified Complex-Time Method," *10<sup>th</sup> European Conference on Antennas and Propagation (EUCAP)*, Davos, Switzerland, 2016, pp. 1-4.
- [13] M. Ghaffari-Miab, F. Valdes, R. Faraji-Dana, and E. Michielssen, "Time-Domain Integral Equation Solver for Planar Structures in Layered Media," *Antennas and Propagation and USNC/URSI National Radio Science Meeting, IEEE International Symposium on*, Lake Buena Vista, FL, 2013, p. 46.
- [14] Z. H. Firouzeh, M. Ghaffari-Miab, R. Moini, S. H. H. Sadeghi, R. Faraji-Dana, and G. A. E. Vandenbosch, "Time-Domain MoM for the Scattering Analysis of Thin-Wire Structures within a Ground Using Band-Limited Second-Order Lagrange Temporal Basis Functions," in *20th Iranian Conference on Electrical Engineering (ICEE)*, Tehran, Iran, 2012, pp. 1102-1107.
- [15] A. N. Askarpour, M. Ghaffari-Miab, R. Faraji-Dana, F. Valdes, and E. Michielssen, "TDIE Solver Based on Novel Closed-Form Time-Domain Green's Functions for Half-Space Problem," in *15th International Symposium of ANtenna Technology and applied ElectroMagnetics (ANTEM)*, France, 2012, pp. 1-4.
- [16] M. Ghaffari-Miab, F. Valdes, and E. Michielssen, "Time-Domain Integral Equation Solver for Planar Circuits over Layered Media Using Finite Difference Generated Green's Functions," *IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, 2011, Spokane, WA.
- [17] F. Valdés, M. Ghaffari-Miab, F. P. Andriulli, K. Cools, J. D. Kotulski, and E. Michielssen, "High-Order Calderón Multiplicative Preconditioner for Time Domain Electric Field Integral Equations," *IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, 2011, Spokane, WA.
- [18] M. Ghaffari-Miab, S. M. H. Haddad, and R. Faraji-Dana, "A new fast and accurate time domain formulation of the method of moment (TD-MoM) for thin-wire antennas," in *IEEE Asia Pacific Microwave Conference (APMC)*, Singapore, 2009, pp. 72-75.

### **TEACHING EXPERIENCE**

Spring 2017 “**Numerical Methods in Electromagnetics**”, Tarbiat Modares University.

Fall 2015&2016 “**Dyadic Green’s Functions in Electromagnetics**”, Tarbiat Modares University.

Spring&Fall 2015, Fall 2016 “**Fiber Optics**”, Tarbiat Modares University.

Fall 2014, Spring 2016&2017 “**Fourier Optics**”, Tarbiat Modares University.

Spring&Fall 2013&14 “**Differential Equations**”, University of Tehran.

Spring&Fall 2013, Spring 2014&2015 “**Physics II** (Electricity and Magnetism)”, University of Tehran.

Spring 2013&14 “**Physics II Lab**”, University of Tehran.

### **ENGINEERING PRACTICE**

- Design and fabrication of Microwave Components and Circuits at Fara Afrand Co. (2009)
- RF & Microwave Measurement: Active Participation in setting up the Type-approval Antenna Measurement Laboratory at the University of Tehran. I have contributed the following accomplished tasks:
  - CTIA (performance of wireless communication devices) test procedures according to Standards
  - Far field antenna measurement
  - Dielectric constant measurement of liquids
  - Certified Training for ISO 17025; Quality Management for Measurement Laboratories
- Deputy head of Bio-Electromagnetics Lab, University of Tehran (Fall 2011)