

Yang Liu

CONTACT INFORMATION

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RESEARCH INTERESTS

Computational electromagnetics: fast time-domain and frequency-domain integral equation methods, plane-wave-time-domain algorithm for solving large-scale transient scattering problems, fast multipole method-based solver and fast direct solver for large-scale problems, high performance computing, compressive sensing.

EDUCATION

University of Michigan, Ann Arbor, MI, USA

Ph.D., Electrical Engineering and Computer Science, May 2015

- Thesis Topic: *Solving Electrically Very Large Transient Electromagnetic Problems Using Plane-Wave Time-Domain Algorithms*
- Advisor: **Professor Eric Michielssen**
- Area of Study: Applied Electromagnetics

M.S., Mathematics, Nov 2014

- Area of Study: Applied Mathematics

M.S., Electrical and Computer Engineering, May 2013

- Area of Study: Applied Electromagnetics

Shanghai Jiao Tong University, Shanghai, China

B.S., Electrical Engineering, June 2010

RESEARCH EXPERIENCE

University of Michigan, Ann Arbor, MI, USA

Research Fellow

June 2015 to Present

- Developing fast direct frequency-domain integral equation solvers for large-scale electromagnetic scattering problems

Research Assistant

Sept 2010 to May 2015

- Developing various fast time-domain integral equation solvers for large-scale transient electromagnetic scattering problems

Shanghai Jiao Tong University, Shanghai, China

Undergraduate Researcher

May 2009 to June 2010

- Developed and fabricated a high-efficiency C-band rectenna and a 100 MHz wireless power transfer system.

Undergraduate Researcher

Apr 2009 to June 2010

- Developed a two-dimensional ADE-FDTD algorithm for numerical modeling the ELF wave propagation in ionosphere.

Undergraduate Researcher

July 2009 to Sept 2009

- Developed a robust compressive sensing algorithm for joint signal recovery in cognitive radio networks.

- [1] A. C. Yucel, **Y. Liu**, H. Bağcı, and E. Michielssen, "Statistical characterization of electromagnetic wave propagation in mine environments," *IEEE Antennas Wireless Propag. Lett.*, vol. 12, pp. 1602-1605, 2013. doi:10.1109/LAWP.2013.2293288
- [2] **Y. Liu**, A. C. Yucel, V. Lomakin, and E. Michielssen, "Graphics processing unit implementation of multilevel plane-wave time-domain algorithm," *IEEE Antennas Wireless Propag. Lett.*, vol. 1, pp. 1-1, 2014. doi:10.1109/LAWP.2014.2350967
- [3] **Y. Liu**, A. C. Yucel, H. Bağcı, and E. Michielssen, "A scalable parallel PWTD-accelerated surface integral equation solver for analysis of transient scattering from large-scale objects," *IEEE Trans. Antennas Propag.*, 2016. doi:10.1109/TAP.2015.2508483
- [4] **Y. Liu**, A. Al-Jarro, H. Bağcı, and E. Michielssen, "Parallel PWTD-accelerated explicit solution of the time domain electric field volume integral equation," *IEEE Trans. Antennas Propag.*, 2016. doi:10.1109/TAP.2016.2546964
- [5] **Y. Liu**, A. C. Yucel, H. Bağcı, A. C. Gilbert, and E. Michielssen, "Wavelet-enhanced plane-wave time-domain algorithm for analysis of transient scattering from electrically large conducting objects," *IEEE Trans. Antennas Propag.*, 2016 (submitted).
- [6] H. Guo, **Y. Liu**, J. Hu, and E. Michielssen, "A MLMDA-based direct integral equation solver for analyzing scattering from electrically large PEC objects," *IEEE Trans. Antennas Propag.*, 2016 (submitted).

- [1] J. Liang, **Y. Liu**, W. Zhang, Y. Xu, X. Gan, and X. Wang, "Joint compressive sensing in wideband cognitive networks," in *Proc. IEEE WCNC*, 2010.
- [2] **Y. Liu**, V. Lomakin, and E. Michielssen, "Graphics processing unit-accelerated implementation of the plane wave time domain algorithm," *28th Ann. Rev. Prog. Appl. Computat. Electromagn.*, 2012.
- [3] **Y. Liu**, A. C. Yucel, V. Lomakin, and E. Michielssen, "A scalable parallel implementation of the plane wave time domain algorithm on graphics processing unit-augmented clusters," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2012.
- [4] **Y. Liu**, H. Bağcı, and E. Michielssen, "Progress in parallel implementation of the multilevel plane wave time domain algorithm," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2013.
- [5] **Y. Liu**, H. Bağcı, and E. Michielssen, "Solving very large scattering problems using a parallel PWTD-enhanced surface integral equation solver," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2013.
- [6] **Y. Liu**, A. Al-Jarro, H. Bağcı, and E. Michielssen, "Parallel, explicit, and PWTD-enhanced time domain volume integral equation solver," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2013.
- [7] A. C. Yucel, **Y. Liu**, H. Bağcı, and E. Michielssen, "A fast-multipole domain decomposition integral equation solver for characterizing electromagnetic wave propagation in mine environments," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2013.
- [8] H. Guo, **Y. Liu**, H. Jun, and E. Michielssen, "A parallel MLMDA-based direct integral equation solver," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2013.
- [9] **Y. Liu**, A. C. Yucel, H. Bağcı, and E. Michielssen, "Parallel multilevel PWTD-enhanced time domain integral equation solvers," in *Proc. SC13*, 2013.
- [10] **Y. Liu**, A. C. Yucel, H. Bağcı, and E. Michielssen, "Parallel time domain solvers for electrically large transient scattering problems," **invited talk**, in *Proc. EUCAP*, 2014.

- [11] **Y. Liu**, A. C. Yucel, H. Bagci, and E. Michielssen, "A parallel wavelet-enhanced PWTD algorithm for analyzing transient scattering from electrically very large PEC targets," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2014.
- [12] A. C. Yucel, **Y. Liu**, H. Bagci, and E. Michielssen, "An FMM-FFT accelerated integral equation solver for characterizing electromagnetic wave propagation in mine tunnels and galleries loaded with conductors," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2014.
- [13] A. C. Yucel, L. Gomez, **Y. Liu**, H. Bagci, and E. Michielssen, "A FMM-FFT accelerated hybrid volume surface integral equation solver for electromagnetic analysis of re-entry space vehicles," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2014.
- [14] **Y. Liu**, A. C. Yucel, A. C. Gilbert, H. Bagci, and E. Michielssen, "A wavelet-based PWTD algorithm-accelerated time domain surface integral equation solver," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2015.
- [15] **Y. Liu**, H. Guo, and E. Michielssen, "A new butterfly reconstruction method for MLMDA-based direct integral equation solvers," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2016.
- [16] **Y. Liu**, H. Guo, and E. Michielssen, "A new MLMDA-based direct integral equation solver for electrically perfect conducting objects," in *Proc. IEEE Int. Symp. AP-S/URSI*, 2016.

TEACHING
EXPERIENCE

Shanghai Jiao Tong University, Shanghai, China

Teaching Assistant

Mar 2009 to June 2009

- Assist students to use circuit design softwares such as Quartus and Keil for the course: Circuit Design and Innovation Experiments.

PROFESSIONAL
ACTIVITIES AND
SERVICES

- **Reviewer** for the Journal of Applied Computational Electromagnetics Society, 2012, 2015 and 2016.
- **Reviewer** for the Journal of Microwaves, Optoelectronics and Electromagnetic Applications, 2014.
- **Reviewer** for the International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, 2015.
- **Session Chair** for "Time-Domain Numerical Methods," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, 2012
- **Chapter Treasurer** for IEEE Southeastern Michigan Section, Chapter IV, 2011-present.
- **Secretary** for IEEE Southeastern Michigan Section, Technical Activities Committee, 2015-present.

HONORS AND
AWARDS

- First Place Winner in Student Paper Competition, 12th International Workshop on Finite Elements for Microwave Engineering, 2014
- Second Place Winner in Student Paper Competition, 28th Annual Review of Progress in Applied Computational Electromagnetics, 2012
- Excellent Graduate Student of Shanghai Jiao Tong University, 2010
- Excellent Student of Shanghai Jiao Tong University, 2008 and 2009
- Third prize in National Electronic Contest, China, 2009

APPLICABLE
SKILLS

- Computer Programming: Fortran, C, C++, ASM, Verilog, VHDL, Keil, Latex
- Numerical Analysis: Matlab, R, Mathematica
- Electromagnetic and other relevant Softwares: CST, ADS, HFSS, FEKO, COMSOL, ProE, Solidworks, Quartus, NS2