Brian MacKie-Mason <brimacki@unm.edu>
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EDUCATION

Doctoral Candidate Electrical Engineering *Expected 2017*
University of New Mexico

- **(Working) Thesis Title**: A high-fidelity surface integral equation method for solving extreme-scale, real-world electromagnetic scattering problems.
- **Advisor**: Professor Zhen Peng, Department of Electrical & Computer Engineering, University of New Mexico

MS Nuclear Engineering *2013*
University of Wisconsin-Madison

BSE Nuclear Engineering *2011*
University of Michigan

PUBLICATIONS

1. **Brian MacKie-Mason**, Andrew Greenwood, and Zhen Peng, "Adaptive and parallel surface integral equation solvers for very large-scale electromagnetic modeling and simulation (invited paper)," *Progress In Electromagnetics Research,* vol. 154, pp. 143–162, 2015. **doi**: 10.2528/PIER15113001
2. **B. MacKie-Mason** and Z. Peng, "Towards Real-time In-Situ Antenna Analysis and Design on Platforms of 1000 Wavelengths", *IEEE AP-S,* San Diego, CA, July 2017 (in press).
3. Zhen Peng and **Brian MacKie-Mason**, "High-Performance Surface Integral Equation Solvers Towards Extreme-Scale Electromagnetic Modeling and Simulation," *IEEE International Conference on Wireless Information Technology and Systems (ICWITS) and Applied Computational Electromagnetics Society (ACES),* Honolulu, HI, U.S.A., March 2016.
4. Zhen Peng, Ralf Hiptmair, Yang Shao, **Brian MacKie-Mason**, "Domain Decomposition Preconditioning for Surface Integral Equations in Solving Challenging Electromagnetic Scattering Problems," *IEEE Transactions on Antennas and Propagation,* vol. 64, no. 1, pp. 210–223, Jan. 2016. **doi**: 10.1109/TAP.2015.2500908
5. **Brian MacKie-Mason**, Z. Peng, "Adaptive, Scalable Domain Decomposition Methods for Surface Integral Equations," *IEEE International Symposium on Antennas and Propagation,* Vancouver, B.C., Canada, July 2015. **doi**: 10.1109/APS.2015.7305220
6. Zhen Peng, **Brian MacKie-Mason**, "Integral equation discontinuous Galerkin methods for time harmonic electromagnetic wave problems," *International Review of Progress in Applied Computational Electromagnetics,* Williamsburg, VA, March 2015.

TALKS/PRESENTATIONS

1. **Brian MacKie-Mason** and Zhen Peng, "Towards a Real-Time Solution of Extreme-Scale Electromagnetic Problems", *2017 USNC-URSI National Radio Science Meeting*, Boulder, CO, USA, January 2017.
2. **Brian MacKie-Mason**, Zhen Peng, and Christopher Kung, "Extreme Fidelity Computational Electromagnetic Analysis in the Supercomputing Era", *The International Conference for High Performance Computing, Networking, Storage, and Analysis*, Salt Lake City, Utah, USA, November 2016.
3. **Brian MacKie-Mason** and Zhen Peng, "High-fidelity, High-performance Integral Equation Solver for Time-Harmonic Maxwell's Equations", *IEEE International Symposium on Antennas*

and Propagation, Fajardo, Puerto Rico, USA, June 2016.

4. **Brian MacKie-Mason** and Zhen Peng, "Adaptive and parallel surface integral equation solvers for very large-scale electromagnetic modeling and simulation", *ECE GSA Student Paper Competition*, Albuquerque, NM, USA, April 2016.
5. **Brian MacKie-Mason** and W. Tang, "Modeling of laser-induced field emission", *Air Force Research Lab Annual Scholar Presentation,* Albuquerque, NM, July 2013.
6. **Brian MacKie-Mason**, N. Lockwood, and W. Tang, "Development of single-walled nanotube fiber cathode diagnostics", *Air Force Research Lab Annual Scholar Presentation,* Albuquerque, NM, July 2012.
7. **Brian MacKie-Mason**, A. Greenwood, and N. Lockwood, "Automated Testing of ICEPIC", *Air Force Research Lab Annual Scholar Presentation,* Albuquerque, NM, July 2011.

TECHNICAL SKILLS

- Parallel Computing, MPI, OpenMP, Domain Decomposition Methods, Surface Integral Equation Methods, College Instruction, Scientific Computing
- Languages: C++, MATLAB, Bash shell, Python, C
- Software Packages: ViSiT, CUBIT, KDevelop, SolidWorks (CAD), Improved Concurrent Electromagnetic Particle-in-Cell (ICEPIC)

RESEARCH EXPERIENCE

Department of Electrical Engineering, University of New Mexico *August 2013 - Present*
Prof. Zhen Peng
Graduate Research Assistant, Computational Electromagnetics

- Researched and developed a geometry-aware domain decomposition (GA-IE-DDM) method for extreme-scale, multi-scale electromagnetics problems.
- Developed tools to automatically partition mesh files for GA-IE-DDM utilizing a k-way graph partitioning code and creating a global-to-local mapping scheme.
- Parallelized GA-IE-DDM in an MPI architecture with C++ for a scalable solution method to the Electric Field Integral Equation.
- Provided project deliverables for DoD HPC Modernization Program (CEA-KY06-003).

Air Force Research Lab, Kirtland AFB *Summers 2011-13*
Drs. Wilkin Tang, Nathaniel Lockwood & Andrew Greenwood
Graduate Research Assistant, Computational Electromagnetics

- Studied the effects of laser-induced field emission (2013).
- Designed diagnostics to improve the study of field emission (2012).
- Designed validation and verification test suite for ICEPIC (2011).

University of Michigan, Ann Arbor *May 2009 - August 2009*
Prof. Gary Was
Lab Assistant, Nuclear Materials

- Wrote MATLAB programs to smooth data and extract empirical modeling equations.
- Made schematic drawings of laboratory equipment using SolidWorks.
- Prepared for and attended lab group meetings.

University of Michigan, Ann Arbor *March 2008 - May 2009*
Prof. Yan Chen
Undergraduate Research Assistant, School of Information

- Conducted human subject computer laboratory experiments.

- Studied trends of Facebook start-up using SQL.

University of Michigan, Ann Arbor *March 2008 - May 2009*
Prof. Yan Chen
Lab Assistant, School of Information
- Assisted graduate students in their human subject computer laboratory experiments.
- Recruited subjects for experiments.
- Edited instructions for experiments.

University of Michigan, Ann Arbor *May 2008 - July 2008*
Prof. Yan Chen
REU Student, School of Information
- Investigated trends of Facebook start-up (urTurn.com) using SQL.
- Made a research presentation on urTurn.com.
- Attended career training seminars.

University of Michigan, Ann Arbor *May 2007 - August 2007*
Prof. Penner-Hahn
Lab Assistant, Department of Chemistry
- Improved upon MATLAB algorithm that imaged microscopic worms.
- Assisted in series of experiments at Argonne National Laboratory.

University of Michigan, Ann Arbor *June 2006 - July 2006*
Prof. Sherman
Lab Assistant, Department of Biology
- Prepared ocean floor samples for discovery of possible bacteria strains.
- Assisted graduate students in preparing laboratory experiments.

TEACHING EXPERIENCE

University of New Mexico *August 2014 - Present*
Department of Electrical & Computer Engineering
Albuquerque, NM
Graduate Teaching Assistant
- ECE 561: Engineering Electrodynamics. Provided selected lectures.
- ECE 555: Foundations of Engineering Electromagnetics. Provided selected lectures.
- ECE 563: Computational Electromagnetics. Provided selected lectures.
- ECE 360: Introduction to Electromagnetics
  - Graded bi-weekly homework assignments.
  - Prepared and held weekly office hours.
  - Provided selected lectures.
- ECE 131: Programming Fundamentals
  - Graded bi-weekly homework assignments.
  - Prepared for and held weekly office hours.

University of Wisconsin-Madison *January 2012 - May 2013*
Department of Engineering Physics
Madison, WI
Graduate Teaching Assistant, EMA 201: Statics
- Prepared and taught two or three hours of discussion section each week.

- Held weekly office hours.
- Graded tests and assignments.
- Participated in bi-weekly planning sessions with other teaching assistants and lead instructor.

Pioneer High School, Ann Arbor *September 2006 - January 2007*
Ms. Hochrein
Teaching Assistant, Mathematics Department

- Graded extra credit assignments.
- Taught lessons on selected topics.
- Answered student questions.

Math Tutor *January 2006 - May 2006*

- Provdided tutoring for two middle school students in mathematics.
- Developed curriculum for tutoring sessions.

PROFESSIONAL SOCIETIES

IEEE *2015 - Present*

SIAM *2016 - Present*

CLEARANCES

DoD Secret *2012-2022*

AWARDS & HONORS

- ECE Outstanding Graduate Student, 2017.
- Who's Who Among American Colleges & Universities, 2017.
- ECE GSA Student Paper Competition – Journal Paper Section, 3rd prize, 2016.
- Eagle Scout, February 2007
- Michigan Peace Prize, January 2007

OTHER EXPERIENCE

UNM GPSA *Fall 2015 - Present*

- GPSA Alternate Representative to Student Fee Review Board (July 2017 - Present)
- Department of ECE Delegate (August 2015 - May 2016, August 2016 - May 2017)
- GPSA Finance Committee Member (August 2016 - May 2017)
- GPSA Representative to Information Technology Committee (August 2015 - May 2016)
- Legislative Steering Committee Member-at-large (February 2016 - May 2016)
- Organized first annual department-wide student paper competition
- Helped arrange for a regular meeting room within the department

ECE Graduate Student Association *Fall 2015 - Present*

- ECE GSA Vice-President (June 2016 - Present)
- ECE GSA Volunteer Member (August 2015 - May 2016)

Alpha Sigma Phi *Fall 2007 - Present*

- Grand Chapter Advisor (November 2012 - May 2013).
- Financial Advisor (November 2012 - Present).
- Brotherhood Development Director (January 2011 - April 2011)
- Philanthropy Director (January 2009 - December 2010).
- Treasurer (January 2008 - December 2009).

Study Abroad in Argentina *June 2010 - August 2010*

- Attained an intermediate working knowledge of spoken and written Spanish.
- Gained extensive practice in intercultural interactions.

MPowered Entrepreneurship *September 2009 - December 2009*

- Member of team that planned Global Entrepreneurship week.
- Recruited entrants for 1000 Pitches contest.
- Promoted the philosophy of entrepreneurship throughout campus.

Youth Group of First United Methodist *September 2001 - June 2007*

- Co-leader of high school team that raised $50,000 to build a church in Bulgaria.
- Part of team that won Michigan Peace Prize (2007) for filming a documentary on religious diversity.
- Participated in multiple service mission trips, including three international locations.

Boy Scouts of America *September 2000 - June 2007*

- Completed an Eagle Scout Service Project.
- Held various leadership positions, including Senior Patrol Leader.
- Participated in outdoor adventure activities with the Venture Patrol.
- Attended the 2001 National Scout Jamboree.
- Completed 25 skills-based merit badges.