Mingyu Lu

Department of Electrical and Computer Engineering
West Virginia University Institute of Technology
Montgomery, WV 25136

Phone: 304-442-3213
Fax: 304-442-3330
E-mail: mingyu.lu@mail.wvu.edu

Education

- Ph. D. in Electrical Engineering, University of Illinois at Urbana-Champaign, Illinois, 10/2002
- Master of Engineering in Electrical Engineering, Tsinghua University, China, 06/1997
- Bachelor of Engineering in Electrical Engineering, Tsinghua University, China, 06/1995

Experience

- Associate professor in the Department of Electrical and Computer Engineering, West Virginia University Institute of Technology, Montgomery, West Virginia (08/2015 – present)
- Assistant professor in the Department of Electrical and Computer Engineering, West Virginia University Institute of Technology, Montgomery, West Virginia (08/2012 – 08/2015)
- Assistant professor in the Department of Electrical Engineering, University of Texas, Arlington, Texas (08/2005 – 08/2012)
- Postdoctoral research associate in the Electromagnetics Laboratory, Department of Electrical and Computer Engineering, University of Illinois, Urbana, Illinois (09/2002 – 07/2005)
- Research assistant in the Electromagnetics Laboratory, Department of Electrical and Computer Engineering, University of Illinois, Urbana, Illinois (08/1997 – 07/2002)
- Research assistant in the Digital Microwave Communication Laboratory, Department of Electronic Engineering, Tsinghua University, Beijing, China (08/1993 – 06/1997)

Awards

- Outstanding service award, IEEE Fort Worth Chapter, 2008
- First place in student paper competition, 2001 IEEE Antennas and Propagation International Symposium, Boston, MA, 2001

Membership

- IEEE senior member

Other activities

- Treasurer, IEEE West Virginia Section, 2013 – present
- Chapter chair, IEEE Antennas and Propagation Society of Fort Worth Chapter, 2006 – 2011
- Session chair, 2004 IEEE AP-S International Symposium and USNC/URSI National Radio Science Meeting, Monterey, CA, 2004
- Session chair, 2010 IEEE AP-S International Symposium and USNC/URSI National Radio Science Meeting, Toronto, Canada, 2010
- Chair of short courses and workshops, 2014 IEEE AP-S International Symposium and USNC/URSI National Radio Science Meeting, Memphis, TN, 2014
- Reviewer, for *IEEE Transactions on Antennas and Propagation*, *IEEE Transactions on Advanced Packaging*, *IEEE Transactions on Electromagnetic Compatibility*, *IEEE Transactions on Microwave Theory and Techniques*, *IEEE Microwave and Wireless Components Letters*, *IEEE Antennas and Wireless Propagation Letters*, *Journal of Computational Physics*, *Radio Science*, *Journal of Nanoscience and Nanotechnology*, *Applied Computational Electromagnetics Society Journal*, *EURASIP Journal on Wireless*

Communications and Networking, *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, Journal of Computational Electronics*

- NSF panelist

Teaching experience

- Courses offered at West Virginia University Institute of Technology
  - Introduction to Electrical Engineering (undergraduate)
  - Introduction to Electrical Engineering Laboratory (undergraduate)
  - Engineering Electromagnetics I (undergraduate)
  - Introduction to Antennas (undergraduate)
- Courses offered at the University of Texas at Arlington
  - Electromagnetics I (undergraduate)
  - Electromagnetics II (undergraduate)
  - Electromagnetic Theory (graduate)
  - Computational Methods for Electrical Engineering (graduate)
  - Theory and Labs of Microwave Measurement (graduate)
  - Electromagnetic and Optical Metamaterials (graduate)
- Courses developed at the University of Texas at Arlington
  - Computational Methods for Electrical Engineering (graduate)
  - Theory and Labs of Microwave Measurement (graduate)
  - Electromagnetic and Optical Metamaterials (graduate)

Research interests

- Antennas
- RF/microwave circuits
- Computational electromagnetics
- Wireless power transmission
- Radar systems
- Wireless communication

Active funded projects

- Collaborative Research: A Novel Wireless Power Transmission Architecture for Devices Implanted in Human Bodies, funded by the National Science Foundation, $212,910, 07/01/2012 – 06/30/2016 (PI: Mingyu Lu)

  The objective of this program is to verify a distributed power transmission architecture to deliver radio frequency power to devices implanted in human bodies. The proposed architecture aims to construct efficient and reliable wireless channels in complex in-body environments for power transfer. If proved feasible, it would fundamentally resolve a few problems associated with the state-of-the-art wireless charging technologies, including low efficiency, potential hazard to human health, and large and heavy apparatuses.
- A Novel Hardware Architecture to Time-Reverse Electromagnetic Signals with Low Cost, funded by the National Science Foundation, $159,679, 08/15/2015 – 07/31/2017 (PI: Mingyu Lu)

  Time-reversal technique is capable of focusing waves in space and time. It has the potential to enable a wide range of revolutionary apparatuses, as shown by extensive prior research. Particularly, "time-reversal of acoustic signals" has been successfully implemented for underwater communication and sonar. However to date, no practical systems for "time-reversal of electromagnetic signals" have been reported; the major pertinent bottleneck is the expensive/bulky hardware required by time-reversing electromagnetic signals (whose frequencies are much higher than acoustic signals'). This research proposes a novel frequency-domain architecture to time-reverse microwave signals with low cost. It is expected to fundamentally resolve the "high-cost

difficulty" associated with "time-reversal of electromagnetic signals," and in turn, to transform numerous prior proof-of-concept endeavors to realistic systems, including but not limited to wireless communication in complex environments and high-resolution imaging radar.

- Developing a High Performance Cluster Computer, funded by West Virginia Higher Education Policy Commission, $20,000, 01/01/2015 – 12/31/2015 (PIs: Afrin Naz and Mingyu Lu)

  In this project, a high performance cluster computer will be developed in the West Virginia University Institute of Technology (WVU Tech). The proposed cluster computer is comprised of 10 computing nodes interconnected with regular Ethernet switches; and each node consists of 2 CPUs and 8-GB RAM. Once constructed, it is expected to achieve at least 10 times of speed-up compared to one single CPU. The proposed high performance cluster computer will enable the PIs to develop courses on parallel programming. Meanwhile, it will create significant synergic impact on the entire undergraduate curriculum of Computer Science and Computer Engineering at WVU Tech. The proposed cluster computer will be connected to the Internet; all the students and faculties of WVU Tech can apply for access to support their education and research.

- Improving High School Teachers' Math Knowledge and Skills, funded by West Virginia Higher Education Policy Commission, $61,625, 03/20/2015 – 10/01/2016 (PIs: Afrin Naz, Mingyu Lu, Kenan Hatipoglu, and Karen Rambo-Hernandez)

  The goal of this ITQ program is to provide professional development training to high school teachers in mathematics. The core of this ITQ program is a one-week summer workshop, which will be held on the campus of West Virginia University Institute of Technology in the summer of 2015. In the proposed summer workshop, participating high school teachers will receive training on project-based learning, which employs projects closely associated with real-world applications to facilitate delivering abstract math concepts. A range of follow-up activities are scheduled after the summer workshop to assist the participating high school teachers to implement project-based learning in high school classrooms. This ITQ program is open to all the 9-th grade and 10-th grade math teachers from Nicholas County, Raleigh County, and Kanawha County.

Past funded projects

- Development of a Stable and Fast Time Domain Integral Equation Solver for Electromagnetic Analysis in Digital Circuits, $10,000, funded by UTA REP program, 09/2007 – 08/2008 (PI: Mingyu Lu)

  The proposed research integrates two techniques: stable time domain integral equation (TDIE) solver and fast *plane wave time domain* algorithm. A novel TDIE solver that is stable and fast has been developed, which satisfies all the requirements for electromagnetic analysis in high-speed digital circuits.

- Dual Slope Based Pulse Position Modulation Circuit for IF-UWB Systems, $56,520, funded by MOSIS, 03/2008 – 02/2009 (PI: Mingyu Lu)

  This project aims to develop a novel pulse-position modulation (PPM) architecture in CMOS technology viable for integration with other impulse-type ultra-wideband components. The fabricated PPM circuit has been tested and applied to vehicle radar application with frequency range 22 GHz to 29 GHz.

- Development of Radar and Image Based Automotive High-Safety SoC, funded by Ministry of Knowledge Economy, Korea, $192,103, 09/2007 – 05/2010 (PIs: Sungyong Jung and Mingyu Lu)

  This research aims at a car-borne ultra-wideband (UWB) radar system at 22 – 29 GHz range. It integrates the following three research efforts. (i) Development of CMOS-based SOC UWB transceiver using the 90 nm IBM CMOS process. (ii) Development of planar wideband antennas. And, (iii) integration of UWB chipset and UWB antenna to implement UWB radar sensor system.

- A Fast Detection and Localization Approach to Monitoring Cables in Underground Power Distribution Network, funded by Signal Processing, Inc., $30,000, 06/19/2010 – 03/18/2011 (PIs: Mingyu Lu and Wei-Jen Lee)

  This project proposes an integrated approach to detect and localize short-circuit and arcing faults in underground power networks. For short-circuit faults, voltage and current techniques are

applied to detect and localize the faults. Detection of arcing faults consists of three major steps: preprocessing to remove background and sensor noise, feature extraction from the harmonics to determine fault signatures, and nonlinear classifier for fault detection. In addition, experimental testbeds are built to emulate realistic power distribution networks and to validate our fault detection algorithms.

- Study and Evaluation on Power System of Point Combort Plant of Formosa Plastics Co., funded by Formosa Plastics Corporation, $121,000, 07/01/2010 – 05/31/2012 (PIs: Wei-Jen Lee and Mingyu Lu)

  Since the plant of Formosa Plastics Co. (FPC) at Point Comfort, TX facility is located near the coastal area, it requires additional monitoring systems to provide real-time information to enhance the service quality. This proposal proposes the development of new equipment to monitor the system response and the engineering study to evaluate operation strategies, possible system re-configurations, and performance tuning for FPC.

- Spectrally-Selective Infrared Sensors based on the Hybrid Integration of Epitaxial and Colloidal Quantum Dots in Photonic Crystal Cavities, funded by Air Force Office of Scientific Research, $606,000, 10/2007 – 10/2012 (PIs: Weidong Zhou and Mingyu Lu)

  Based on the advances in the integration of epitaxial quantum dot (QD) system with photonic crystal (PC) cavities, the objective of this research is to extend the spectral coverage with the hybrid integration of colloidal/epitaxial QDs and PC cavities for a single pixel. A multi-spectral infrared photodetector using hybrid nanomaterial active regions and PC cavities in a single device heterostructure for enhanced absorption at selected wavelengths will be demonstrated.

- Experimental Testbed to Study Wireless Communication in Underground Coal Mines, funded by West Virginia Higher Education Policy Commission, $20,000, 01/01/2013 – 12/31/2013 (PIs: Mingyu Lu, Nan Wang, and Houbing Song)

  In this project, an experimental testbed will be constructed in the West Virginia University Institute of Technology (WVU Tech). The proposed testbed resembles realistic underground coal mining environments; and, a wide range of experiments can be conducted in the testbed to demonstrate and study wireless communication in coal mines. The testbed will constitute an excellent platform for undergraduate students of WVU Tech to gain knowledge and experience pertinent to wireless communication. It will significantly enrich the undergraduate curriculum of the Electrical and Computer Engineering Department of WVU Tech. Further, it will enable various research efforts to improve the wireless technologies in underground coal mines.

- 2013 CS4HS Google Workshop, funded by Google Inc., $12,500, 4/01/2013 – 3/31/2014 (PIs: Afrin Naz, Mingyu Lu, Gifty Osei-Prempeh, Kimberlyn Gray, and Ranjith Munasinghe)

  The goal of organizing this workshop is to promote the high school education on computing in the State of West Virginia. This workshop would be the first CS4HS workshop in West Virginia focused on training high school teachers to prepare for computing courses. Specifically, approximately 30 high school teachers will be invited to West Virginia University Institute of Technology to attend the workshop; they would learn about state-of-the-art computing technology and theory; they would get hands-on training on pedagogical tools; and, they would have extensive opportunities to work with university educators to find about how to inspire the high school students (particularly those from the minority groups) to choose computing majors.

- Field Test Bed of Connected Vehicle Applications in the Mountainous Terrain of West Virginia, funded by West Virginia Higher Education Policy Commission, $30,000, 3/01/2013 – 12/31/2014 (PIs: Stephen D. Goodman, Mingyu Lu, Houbing Song, and Nan Wang)

  The objective of this project is to construct a Connected Vehicle test bed as (i) an instrument to assist with the undergraduate engineering education program at West Virginia University Institute of Technology (WVU Tech), and (ii) an experimental platform to investigate Connected Vehicle applications in the mountainous terrain of West Virginia. The proposed test bed will be integrated into a wide range of undergraduate courses. It will enable a variety of senior design projects. Because the test bed is related to everyday road transportation, it would serve to motivate more students to select engineering and science as their future careers. Furthermore, it will build a solid foundation for us to capture the upcoming research opportunities created by the Connected

Vehicle program, which is a long-term strategic plan issued by the United States Department of Transportation.

- Toyota Summer STEM Girls Camp, funded by Toyota Motor North America, $13,895, 04/01/2014 – 03/31/2015 (PIs: Afrin Naz and Mingyu Lu)

  In this project, a five-day Summer STEM Girls Camp will be held in Buffalo High School, located in Putnam County, West Virginia, in the summer of 2014. The proposed camp is open to female students from the four high schools of Putnam County, including Buffalo High School, Hurricane High School, Winfield High School, and Poca High School. The main objective of this project is to inspire female high school students' interests in STEM (science, technology, engineering, and mathematics) disciplines and to encourage them to choose STEM as their college majors.

- 2014 CS4HS Google Workshop, funded by Google Inc., $35,000, 4/01/2014 – 3/31/2015 (PIs: Afrin Naz, Mingyu Lu, and Kenan Hatipoglu)

  The primary focus of this online workshop is to construct a scalable platform to instruct fundamental knowledge and skills of Computer Science to high school teachers. This 2014 Google CS4HS Workshop is open to high school teachers in USA and Canada who are interested in professional development in the discipline of Computer Science. By attending this 2014 Google CS4HS online workshop, the participants would learn about fundamental knowledge of Computer Science; they would get hands-on training on various pedagogical tools; they would be exposed to state-of-the-art computing technologies; and, they would have opportunities to discuss with university educators on how to prepare high school students (particularly those from minority groups) for college majors related to computer/computing.

Patent

M. Lu and R. E. Billo, "Wireless Power Transmission," US Patent No. 9030161, granted in 2015.

Publications

- Book chapters
  1. E. Michielssen, B. Shanker, K. Aygun, M. Lu, and A. Ergin, "Plane-wave time-domain algorithms and fast time-domain integral equation solvers," *Review of Radio Science*, R. Stone, Ed., pp. 181-200, IEEE Press / Wiley Interscience, New York, 2002.
  2. M. Lu, J. W. Bredow, S. Jung, and S. Tjuatja, "A quasi-planar wide band conical antenna," *Ultra Wideband, Short Pulse Electromagnetics*, C. Baum, A. Stone, and S. Tyo, Ed., Springer-Verlag New York, Inc., 2007.

- Journal publications
  1. M. Lu, J. Wang, A. A. Ergin, and E. Michielssen, "Fast evaluation of two-dimensional transient wave fields," *Journal of Computational Physics*, vol. 158, pp.161-185, 2000.
  2. J. Wang, M. Lu, and E. Michielssen, "A time-domain volume-integral equation approach for analyzing scattering from 2-D nonlinear objects under TM illumination," *Microwave and Optical Technology Letters*, vol. 26, pp. 419-423, 2000.
  3. D. Jiao, M. Lu, E. Michielssen, and J.-M. Jin, "A fast time-domain finite element-boundary integral method for electromagnetic analysis," *IEEE Transactions on Antennas and Propagation*, vol. 49, no. 10, pp. 1453-1462, October 2001.
  4. Y. Yu, D. Weile, M. Lu, and E. Michielssen, "Time domain integral equation based analysis of scattering from conducting surfaces including the singular edge behavior," *Microwave and Optical Technology Letters*, vol. 34, pp. 327-332, September 2002.
  5. B. Shanker, A. A. Ergin, M. Lu, and E. Michielssen, "Fast analysis of transient electromagnetic scattering phenomena using the multilevel plane wave time domain algorithm," *IEEE Transactions on Antennas and Propagation,* vol. 51, no. 3, pp. 628-641, 2003.

6. M. Lu, M. Lv, A. A. Ergin, B. Shanker, and E. Michielssen, “Multilevel plane wave time domain-based global boundary kernels for two-dimensional finite difference time domain simulations,” *Radio Science*, vol. 39, no. 4, Art. No. RS4007, August 2004.
7. M. Lu, B. Shanker, and E. Michielssen, “Elimination of spurious solutions associated with exact transparent boundary conditions in FDTD solvers,” *IEEE Antennas and Wireless Propagation Letters*, vol. 3, pp. 59-62, 2004.
8. M. Lu, K. Yegin, B. Shanker, and E. Michielssen, “Fast time domain integral equation solvers for analyzing two-dimensional scattering phenomena; Part I: temporal acceleration,” *Electromagnetics*, vol. 24, no. 6, pp. 425-449, 2004.
9. M. Lu, B. Shanker, and E. Michielssen, “Fast time domain integral equation solvers for analyzing two-dimensional scattering phenomena; Part II: full PWTD acceleration,” *Electromagnetics*, vol. 24, no. 6, pp. 451-470, 2004.
10. Q. Chen, M. Lu, and E. Michielssen, “Incorporation of the impedance boundary condition in the time domain integral equation method,” *Microwave and Optical Technology Letters*, vol. 42, no. 3, pp. 213-220, August 2004.
11. N.-W. Chen, M. Lu, F. Capolino, B. Shanker, and E. Michielssen, “Floquet-wave-based analysis of transient scattering from doubly periodic perfectly conducting bodies,” *Radio Science*, vol. 40, no. 4, Art. No. RS4007, August 2005.
12. B. Shanker, M. Lu, A. A. Ergin, and E. Michielssen, “Plane-wave time-domain accelerated radiation boundary kernels for FDTD analysis of 3D electromagnetic phenomena,” *IEEE Transactions on Antennas and Propagation*, vol. 53, no. 11, pp. 3704-3716, November 2005.
13. M. Lu and S. Jung, “On the well-posedness of integral equations associated with cavity Green’s functions around resonant frequencies,” *Microwave and Optical Technology Letters*, vol. 51, no. 6, pp. 1476-1481, June 2009.
14. M. Lu, J. W. Bredow, S. Jung, and S. Tjuatja, “Evaluation of Green’s functions of rectangular cavities around resonant frequencies in the method of moments,” *IEEE Antennas and Wireless Propagation Letters*, vol. 8, pp. 204-208, 2009.
15. B. Shanker, M. Lu, J. Yuan, and E. Michielssen, “Time domain integral equation analysis of scattering from composite bodies via exact evaluation of radiation fields,” *IEEE Transactions on Antennas and Propagation*, vol. 57, no. 5, pp. 1506-1520, May 2009.
16. C. Huang, J. Jiang, M. Lu, L. Sun, E. I. Meletis, and Y. Hao, "Capturing electrochemically evolved nanobubbles by electroless deposition. A facile route to the synthesis of hollow nanoparticles," *Nano Letters*, vol. 9, no. 12, pp. 4297-4301, December 2009.
17. P. P. Ghosh, M. Lu, and S. Jung, “Design of a radiation hard phase-locked loop at 2.5 GHz using SOS-CMOS,” *Journal of Systems Engineering and Electronics*, vol. 20, no. 6, pp. 1159-1166, December 2009.
18. H. Zhai, S. Sha, V. K. Shenoy, S. Jung, M. Lu, K. Min, S. Lee, and D. S. Ha, “An electronic circuit system for time-reversal of ultra-wideband short impulses based on frequency domain approach,” *IEEE Transactions on Microwave Theory and Techniques*, vol. 58, no. 1, pp. 74-86, January 2010.
19. H. Zhai, S. Jung, and M. Lu, “Wireless communication in boxes with metallic enclosure based on time-reversal ultra-wideband technique: a full-wave numerical study,” *Progress In Electromagnetics Research*, vol. PIER 101, pp. 63-74, 2010.
20. V. M. Vikram, S. Sha, J. W. Bredow, and M. Lu, "Wideband cavity backed slot antenna for automotive monopulse radars," *Electronics Letters*, vol. 46, no. 10, pp. 675–677, May 2010.
21. H. Zhai, S. Tjuatja, J. W. Bredow, and M. Lu, “A quasi-planar conical antenna with broad bandwidth and omnidirectional pattern for ultrawideband radar sensor network

applications," *IEEE Transactions on Antennas and Propagation*, vol. 58, no. 11, pp. 3480-3489, November 2010.

22. Y. Shi, M.-Y. Xia, R.-S. Chen, E. Michielssen, and M. Lu, "Stable electric field TDIE solvers via quasi-exact evaluation of MOT matrix elements," *IEEE Transactions on Antennas and Propagation*, vol. 59, no. 2, pp. 574-585, February 2011.
23. M. Lu, H. Zhai, and R. Magnusson, "Focusing light with curved guided-mode resonant reflectors," *Micromachines*, vol. 2, no. 2, pp. 150-156, February 2011.
24. S. K. Gunnala, S. Sha, J. W. Bredow, S. Tjuatja, J. Chen, and M. Lu, "Wideband cavity-backed slot antenna for ground penetrating free of direct ground bounce," *Electromagnetics*, vol. 31, no. 3, pp. 192-214, 2011.
25. S. Sha, H. Zhai, V. R. Gowda, N.-W. Chen, W. Zhou, and M. Lu, "Experimental and numerical study of highly-sensitive displacement sensors based on photonic crystals at microwave band," *Microwave and Optical Technology Letters*, vol. 54, no. 2, pp. 432-434, 2012.
26. T. K. Saha, M. Lu, Z. Ma, and W. Zhou, "Design of an angle detector for laser beams based on grating coupling," *Micromachines*, vol. 3, pp. 36-44, 2012.
27. S. Sha, J. Chen, and M. Lu, "Efficient measurement of impulses based on frequency-domain approach," *IEEE Transactions on Instrumentation and Measurement*, vol. 61, no. 6, pp. 1757-1764, 2012.
28. J. Sun, Y. Huang, and M. Lu, "Optimize aluminum's surface roughness in rolling lubrication process," *Industrial Lubrication and Tribology*, vol. 65, no. 3, pp. 175-180, 2013.
29. Y. Shi, H. Bagci, and M. Lu, "On the internal resonant modes in marching-on-in-time solution of the time domain electric field integral equation," *IEEE Transactions on Antennas and Propagation*, vol. 61, no. 8, pp. 4389-4392, August 2013.
30. J. Sun, M. Yi, Q. Sun, and M. Lu, "Experimental investigation of the relationship between lubricants' tribological properties and their lubricating performances in cold rolling," *Journal of Tribology*, vol. 136, no. 3, pp. 034502, March 2014.
31. Y. Shi, H. Bagci, and M. Lu, "On the static loop modes in the marching-on-in-time solution of the time-domain electric field integral equation," *IEEE Antennas and Wireless Propagation Letters*, vol. 13, pp. 317-320, 2014.
32. X. Wang, S. Sha, J. He, L. Guo, and M. Lu, "Wireless power delivery to low-power mobile devices based on retro-reflective beamforming," *IEEE Antennas and Wireless Propagation Letters*, vol. 13, pp. 919-922, 2014.
33. J. He, X. Wang, L. Guo, S. Shen, and M. Lu, "A distributed retro-reflective beamformer for wireless power transmission," *Microwave and Optical Technology Letters*, vol. 57, no. 8, pp. 1873-1876, August 2015.
34. J. Ma, X. Zhang, Q. Huang, L. Cheng, and M. Lu, "Experimental study on the impact of soil conductivity on underground magneto-inductive channel," *IEEE Antennas and Wireless Propagation Letters*, vol. 14, pp. 1782-1785, 2015.

- Conference publications

1. M. Lu and C. Shi, "A high-quality ultra-wideband omni-direction antenna," presented at IEEE International Symposium on Electromagnetic Compatibility, Beijing, China, May 1997.
2. M. Lu, E. Michielssen, P. Mayes, and P. Ingerson, "A dual mode log-periodic cavity-backed slot antenna," *Proceedings of the 1999 International IEEE-APS Symposium*, Orlando, FL, pp. 124-127, June 1999.
3. M. Lu, J. Wang, A. Ergin, and E. Michielssen, "A diagonal translation operator for the fast evaluation of two-dimensional wave fields," *Proceedings of the 1999 International IEEE-APS Symposium*, Orlando, FL, pp. 1338-1341, June 1999.

4. J. Wang, M. Lu, and E. Michielssen, "Acceleration of two-dimensional time domain integral equation solvers using a Hilbert transform," *Proceedings of the 1999 International IEEE-APS Symposium*, Orlando, FL, pp. 1354-1357, June 1999.
5. J. Wang, B. Shanker, M. Lu, and E. Michielssen, "Exact absorbing boundary conditions for 2D FDTD simulations based on multilevel plane wave time domain algorithms," *Proceedings of the 1999 International URSI Symposium*, Orlando, FL, p. 268, June 1999.
6. J. Wang, M. Lu, and E. Michielssen, "Volume integral equation based method for transient scattering from nonlinear penetrable objects-TM case," *Proceedings of the 2000 IEEE Antenna and Propagation Symposium*, Salt Lake City, Utah, vol. 2, pp. 729-732, July 2000.
7. M. Lu, B. Shanker, A. A. Ergin, and E. Michielssen, "Novel 2D transient EFIE, MFIE, and CFIE solvers based on the multilevel plane wave time domain algorithm," *Proceedings of the 2000 IEEE Antenna and Propagation Symposium*, Salt Lake City, Utah, vol. 2, pp. 737-740, July 2000.
8. M. Lu, A. A. Ergin, and E. Michielssen, "Fast evaluation of transient fields in the presence of two half spaces using a plane wave time domain algorithm," *Proceedings of the 2000 URSI Symposium*, Salt Lake City, Utah, p. 166, July 2000.
9. D. Jiao, M. Lu, E. Michielssen, and J. M. Jin, "A fast time-domain finite element-boundary integral method for electromagnetic transient analysis," Presented at the 5th Finite Elements Workshop for Microwave Engineering, Boston, MA, June 2000.
10. K. Aygun, M. Lu, B. Shanker, and E. Michielssen, "Analysis of PCB level EMI phenomena using an adaptive low-frequency plane wave time domain algorithm," *Proceedings of the 2000 IEEE Int. Symp. On EMC*, Washington DC, vol. 1, pp. 295-300, August 21-25, 2000, (invited).
11. Y. Yu, D. S. Weile, M. Lu, and E. Michielssen, "Full-wave time-domain analysis of conducting surfaces including the singular edge behavior," *Proceedings of the 2001 URSI Symposium*, Boston, MA, p. 365, July 2001.
12. E. Michielssen, K. Aygun, M. Lu, K. Yegin, B. Shanker, and D. S. Weile, "Fast time domain integral equation solvers: trends and challenges," Presented at the 2001 IEEE International Antenna and Propagation Symposium, Boston, MA, July 2001.
13. E. Michielssen, A. Boag, B. Shanker, and M. Lu, "Fast plane wave time domain algorithms for quasi-planar structures," Presented at *the 2001 URSI Symposium*, Boston, MA, July 2001.
14. M. Lu, J. Sarvas, and E. Michielssen, "A simplified 3D plane wave time domain (PWTD) algorithm," *Proceedings of the 2001 IEEE International Antenna and Propagation Symposium*, Boston, MA, pp. 188-191, July 2001.
15. M. Lu and E. Michielssen, "A marching-on-in-time based transient electric field integral equation solver for microstrip structures," *Proceedings of the 2001 IEEE International Antenna and Propagation Symposium*, Boston, MA, pp. 782-785, July 2001.
16. M. Lu and E. Michielssen, "Closed form evaluation of time domain fields due to Rao-Wilton-Glisson sources for use in marching-on-in-time based EFIE solvers," *Proceedings of the 2002 IEEE International Antenna and Propagation Symposium*, San Antonio, Texas, vol. 1, pp. 74-77, June 2002.
17. N. Chen, M. Lu, B. Shanker, E. Michielssen, and F. Capolino, "Fast integral-equation-based analysis of transient scattering from doubly periodic perfectly conducting structures," Presented at the 2003 USNC/CNC/URSI National Radio Science Meeting, Columbus, Ohio, June 2003.
18. N. Liu, M. Lu, A. E. Yilmaz, K. Aygun, B. Shanker, and E. Michielssen, "A parallel marching on in time solver accelerated by plane wave time domain algorithm," Presented at the 2003 USNC/CNC/URSI National Radio Science Meeting, Columbus, Ohio, June 2003.

19. K. Aygun, M. Lu, N. Liu, A. E. Yilmaz, and E. Michielssen, "A parallel PWTD accelerated time marching scheme for analysis of EMC/EMI problems," Presented at IEEE International Symposium on EMC, Istanbul, Turkey, 2003.
20. V. Lomakin, M. Lu, S. Li, E. Michielssen, "Calculation of transient fields in the presence of a multilayered medium," Presented at Proceedings of Progress in Electromagnetics Research Symposium (PIERS), Honolulu, Hawaii, October 2003.
21. M. Lv, M. Lu, P. S. Carney, and E. Michielssen, "FDTD simulation of 3D surface plasmon polariton band gap waveguide structures," Presented at the 2004 IEEE Antennas and Propagation Society Symposium, Monterey, CA, June 2004.
22. N. Chen, M. Lu, P. Jiang, F. Capolino, B. Shanker, and E. Michielssen, "A time-marching scheme for analyzing transient scattering from nonplanar doubly periodic structures," Presented at the 2004 IEEE Antennas and Propagation Society Symposium, Monterey, CA, June 2004.
23. M. Lu and E. Michielssen, "A local filtering scheme for FMM/PWTD algorithms," Presented at the 2004 IEEE Antennas and Propagation Society Symposium, Monterey, CA, June 2004.
24. N. Liu, M. Lu, B. Shanker, and E. Michielssen, "The parallel plane wave time domain algorithm-accelerated marching on in time solvers for large-scale electromagnetic scattering problems," Presented at the 2004 IEEE Antennas and Propagation Society Symposium, Monterey, CA, June 2004.
25. Q. Chen, M. Lu, and E. Michielssen, "Integral equation based analysis of transient scattering from surfaces with impedance boundary condition," Presented at the 2004 IEEE Antennas and Propagation Society Symposium, Monterey, CA, June 2004.
26. M. Lu, J. Meng, and E. Michielssen, "A novel temporal basis function for time domain integral equation solvers," Presented at the 2005 IEEE Antennas and Propagation Society Symposium, Washington, DC, July 2005.
27. M. Lu, B. Shanker, and E. Michielssen, "On uniform versus non-uniform sampling of far-field patterns in the plane wave time domain algorithm," Presented at the 2005 IEEE Antennas and Propagation Society Symposium, Washington, DC, July 2005.
28. J. Meng, M. Lu, and E. Michielssen, "A fast space-adaptive algorithm to evaluate transient wave fields due to low-frequency source constellations," Presented at the 2005 IEEE Antennas and Propagation Society Symposium, Washington, DC, July 2005.
29. M. Lu, G. Kobidze, A. Yilmaz, B. Shanker, and E. Michielssen, "Development of parallel higher order time domain integral equation solvers," Presented at the 2005 URSI National Radio Science Meeting, Washington, DC, July 2005.
30. J. Meng, M. Lu, and E. Michielssen, "Towards efficient and stable low frequency time domain integral equation solvers," Presented at the 2006 IEEE Antennas and Propagation Society Symposium, Albuquerque, NM, July 2006.
31. M. Lu, J. W. Bredow, and S. Tjuatja, "A quasi-planar wide band conical antenna," Presented at the 2006 IEEE Antennas and Propagation Society Symposium, Albuquerque, NM, July 2006.
32. M. Lu, J. W. Bredow, S. Jung, and S. Tjuatja, "Theoretical and experimental study of a quasi-planar conical antenna," Presented at the 2007 IEEE Antennas and Propagation Society Symposium, Honolulu, HW, June 2007.
33. M. Lu, N.-W. Chen, J. W. Bredow, S. Jung, and S. Tjuatja, "Study of photonic crystals at millimeter wave band," Presented at the 2007 IEEE Antennas and Propagation Society Symposium, Honolulu, HW, June 2007.
34. M. Lu, J. W. Bredow, S. Jung, and S. Tjuatja, "On the resonant singularities associated with the Green's functions of metallic rectangular cavities in the context of the method of moments," Presented at the 2007 IEEE Antennas and Propagation Society Symposium, Honolulu, HW, June 2007.

35. S. K. Gunnala, M. Lu, J. W. Bredow, and S. Tjuatja, “A broadband proximity antenna for subsurface sensing,” Presented at the Progress in Electromagnetics Research Symposium, Hangzhou, China, March 2008.
36. L. M. Camacho, M. Lu, and S. Tjuatja, “FDTD modeling of emission from finite-size object,” Presented at the Progress in Electromagnetics Research Symposium, Hangzhou, China, March 2008.
37. T. Wu, M. Lu, K. Trasi, and S. Tjuatja, “Localization of passive targets based on a radar sensor network,” Presented at the Progress in Electromagnetics Research Symposium, Hangzhou, China, March 2008.
38. H. Yang, Z. Qiang, H. Pang, Z. Ma, W. Zhou, M. Lu, and R. A. Soref, “Surface-normal fano filters based on transferred silicon nanomembranes on glass substrates,” Presented at the 2008 Conference on Lasers and Electro-Optics, San Jose, CA, May 2008.
39. Z. Qiang, W. Zhou, M. Lu, and G. J. Brown, "Fano resonance enhanced infrared absorption for infrared photodetectors," *Proceedings of the SPIE: Photonic Crystal Materials and Devices VII*, vol. 6901, pp. 69010F-69010F-8, 2008.
40. M. Lu, J. W. Bredow, S. Jung, and S. Tjuatja, “On the well-posedness of integral equations associated with cavity Green’s functions around resonant frequencies,” Presented at the 2008 IEEE Antennas and Propagation Society Symposium, San Diego, CA, July 2008.
41. S. K. Gunnala, M. Lu, J. W. Bredow, and S. Tjuatja, “A novel wide-band slot antenna for ground penetrating radar,” Presented at the 2008 IEEE Antennas and Propagation Society Symposium, San Diego, CA, July 2008.
42. S. K. Gunnala, M. Lu, J. W. Bredow, and S. Tjuatja, “Subsurface sensing of near surface object using cavity backed slot (CBS) antenna,” Presented at the 2008 IEEE International Geoscience & Remote Sensing Symposium, Boston, MA, July 2008.
43. T. Merkin, J. C. Li, S. Jung, M. Lu, J. Gao, and S. Lee, “A 100-960 MHz CMOS ultra-wideband low noise amplifier,” Presented at IEEE Midwest Symposium on Circuits and Systems, pp. 141-144, Knoxville, TN, August 2008.
44. V. Shenoy, P. Kalkura, S. Jung, M. Lu, J. Gao, and S. Lee, “A dual slope based pulse position modulation for sub-GHz IR-UWB systems,” Presented at IEEE Midwest Symposium on Circuits and Systems, pp. 846-849, Knoxville, TN, August 2008.
45. V. Shenoy, S. Sha, S. Jung, and M. Lu, “A circuit implementation for time-reversal of short impulses,” Presented at Asia Pacific Microwave Conference 2008, Hong Kong, China, December 2008.
46. L. M. Camacho, M. Lu, and S. Tjuatja, “Numerical study of emissivity from finite-size cylindrical-shape objects,” Presented at the Progress in Electromagnetics Research Symposium, Beijing, China, March 2009.
47. S. Sha, V. Shenoy, S. Jung, M. Lu, K. Min, and S. Lee, “A hardware architecture for time reversal of short impulses based on frequency domain approach,” Presented at SPIE Defense, Security, and Sensing 2009, Orlando, FL, April 2009.
48. J. Li, M. Lu, S. Jung and K. Min, "A CMOS ultra-wideband impulse generator for 22-29 GHz automotive radar applications," Presented at IEEE Radar Conference, Pasadena, CA, May 2009.
49. V. Shenoy, S. Jung, M. Lu, and H. Zhai, "A practical time-reversal circuit system for ultra-wideband wireless communication in enclosed-space environments," Presented at US-Korea Conference, Raleigh, NC, August 2009.
50. J. Li, S. Jung, M. Lu, P. Gui, and Y. Joo, "A current-steering DAC-based CMOS ultra-wideband impulse generator," Presented at IEEE International Symposium on Communication and Information Technology, Incheon, South Korea, September 2009.

51. M. Vikram, M. Lu, B. Shanker, and E. Michielssen, "A parallel implementation of the PWTD algorithm for time-domain electromagnetic simulations," Presented at IEEE Antennas and Propagation Symposium, Toronto, Canada, July 2010.
52. H. Zhai, H. K. Pan, and M. Lu, "A practical wireless charging system based on ultra-wideband retro-reflective beamforming," Presented at IEEE Antennas and Propagation Symposium, Toronto, Canada, July 2010.
53. Y. Shi, M.-Y. Xia, R.-S. Chen, E. Michielssen, and M. Lu, "A stable marching-on-in-time solver for time domain surface electric field integral equations based on exact integration technique," Presented at IEEE Antennas and Propagation Symposium, Toronto, Canada, July 2010.
54. H. Zhai and M. Lu, "Full-wave numerical study of wireless communication in boxes with metallic enclosure based on time-reversal ultra-wideband technique," presented at IEEE Antennas and Propagation Symposium, Toronto, Canada, July 2010.
55. J. Li, S. Jung, M. Lu, and K. Min, "A CMOS ultra-wideband transmitter with bi-phase modulation for 22-29 GHz vehicular radar application," presented at IEEE International Midwest Symposium on Circuits and Systems, Seattle, WA, August 2010.
56. T. Saha, M. Lu, H. Zhai, D. Zhao, W. D. Zhou and Z. Ma, "Design of a compact grating coupler with controllable linewidths via transverse resonance and evanescent field coupling", presented at IEEE Winter 2011 Topicals on Photonic Materials and Integration Architecture, Keystone, CO, January 2011.
57. O. Limaye, M. Lu, W.-J. Lee, J. Zhou, B. Ayhan, and C. Kwan, "Novel algorithms for detection of short-circuit faults in the underground power distribution network," presented at the IEEE Power Systems Conference and Exhibition, Phoenix, AZ, March 2011 (awarded the 2nd prize in the graduate student poster contest).
58. A. Pray, N. Nair, M. Vikram, M. Lu, B. Shanker, and E. Michielssen, "A parallel implementation of the PWTD algorithm for time-domain electromagnetic simulations," presented at IEEE International Symposium on Antennas and Propagation, Spokane, WA, July 2011.
59. S. Sha, J. Chen, and M. Lu, "Fourier transforming microwave impulses using low-cost analog circuits," presented at IEEE Microwave Theory and Techniques Society (MTT-S) International Microwave Symposium, Baltimore, MD, June 2011.
60. J. Zhou, B. Ayhan, C. Kwan, O. D. Limaye, M. Lu, and W. Lee, "Locating short-circuit faults in underground networks," presented at IEEE Industry Applications Society Annual Meeting (IAS), Orlando, FL, October 2011.
61. T. K. Saha, M. Lu, D. Zhao, Z. Ma, and W. Zhou, "Design of second order grating couplers to detect the angle and polarization of the laser beam," presented at SPIE High Contrast Metastructures, San Francisco, CA, January 2012.
62. S. Sha and M. Lu, "A hardware demonstration of wireless power transmission based on retro-reflective beamforming," presented at IEEE International Symposium on Antennas and Propagation, Chicago, IL, July 2012.
63. Y. Shi, H. Bagci, and M. Lu, "On spurious resonant modes in the MOT solution of time domain EFIE," presented at IEEE International Symposium on Antennas and Propagation, Orlando, FL, July 2013.
64. Y. Shi, H. Bagci, M. Lu, B. Shanker, and E. Michielssen, "Quasi-exact evaluation of time domain MFIE MOT matrix elements," presented at IEEE International Symposium on Antennas and Propagation, Orlando, FL, July 2013.
65. A. Naz and M. Lu, "A Google computer science for high school workshop," presented at the 121st ASEE Annual Conference and Exposition, Paper ID #9720, Indianapolis, IN, June 2014.
66. A. Naz, M. Lu, and R. Munasinghe, "Collaboration for student success in STEM fields: a novel approach," presented at STEM 2014 Conference, Vancouver, Canada, July 2014.

67. Y. Shi, H. Bagci, and M. Lu, "On the DC loop modes in the MOT solution of the time domain EFIE," presented at IEEE International Symposium on Antennas and Propagation, Memphis, TN, July 2014.
68. X. Wang, J. He, L. Guo, S. Sha, and M. Lu, "Wireless charging for low-power mobile devices based on retro-reflective beamforming," presented at IEEE International Symposium on Antennas and Propagation, Memphis, TN, July 2014.
69. A. Naz and M. Lu, "An online Google workshop for high school teachers," presented at the 122nd ASEE Annual Conference and Exposition, Paper ID #12405, Seattle, WA, June 2015.
70. A. Naz, M. Lu, and S. Mustafa, "Applying Google tools to facilitate online teaching," presented at the 122nd ASEE Annual Conference and Exposition, Paper ID #12961, Seattle, WA, June 2015.
71. J. He, X. Wang, L. Guo, S. Shen, and M. Lu, "A distributed retro-reflective beamforming scheme for wireless power transmission," presented at IEEE International Symposium on Antennas and Propagation, Vancouver, Canada, July 2015.
72. X. Wang, X. Hou, L. Wang, and M. Lu, "Employing phase-conjugation antenna array to beam microwave power from satellite to earth," to be presented at IEEE International Conference on Wireless for Space and Extreme Environments, Orlando, FL, December 2015.