

Robert Lee

Department Address:

ECE Department
The Ohio State University
2015 Neil Avenue
Columbus, OH 43210
e-mail: Lee.146@osu.edu
Tel: 614-292-2571
Fax: 614-292-7596

Laboratory Address:

ElectroScience Laboratory
1320 Kinnear Road
Columbus, OH 43212
Tel: 614-292-7298
Fax: 614-292-7297

Degrees:

B.S. in Electrical Engineering, Lehigh University, Bethlehem, PA, June, 1983.
M.S. in Electrical Engineering, University of Arizona, Tucson, AZ, January, 1988.
Ph.D. in Electrical Engineering, University of Arizona, Tucson, AZ, August, 1990.

Employment Record:

2007-Present Department Chair, ECE Department

2005-2006 Graduate Studies Chair, ECE Department

2001-Present Professor, The Ohio State University

1996-2001 Associate Professor, The Ohio State University.

1990-1996 Assistant Professor, The Ohio State University.

1986-1990 Research Assistant, University of Arizona; finite element modeling of electromagnetic scattering from complex structures; integral equation modeling of electromagnetic coupling and penetration of apertures.

1987-1989 Visiting Scientist, Sandia National Laboratories, Albuquerque, NM 87185; developed numerical models for the evaluation of electromagnetic properties in the Particle Beam Fusion Accelerator.

1984-1986 Member of the Technical Staff, Hughes Aircraft Company, Missile Systems Group, Tucson, AZ 85706; involved in the development of a microwave IMPATT diode oscillator; modeling and characterization of high-power IMPATT diodes.

1983-1984 Microwave Engineer, Microwave Semiconductor Corporation, Somerset, NJ; design of microwave transistors and amplifiers using both silicon bipolar transistors and Gallium Arsenide FET's; numerical modeling of Gallium Arsenide FET's.

Honors:

- Graduate Merit Award, University of Arizona, 1989
- URSI Student Prize Paper Contest, First Place, 1990
- Lumley Research Award, College of Engineering, The Ohio State University, 1995, 1999, and 2003.
- URSI Young Scientist Award, 1996
- ISI Most Highly Cited (top 1.5% of all published researchers)

Student Paper Awards by Advisees:

- William Pinello, 2nd Place in AP-S Student Paper Contest, 1992
- Jovan Jevtic, ESL Outstanding Masters Thesis Award, 1994
- Jovan Jevtic, 2nd Place in URSI Student Paper Contest, 1995
- John Nehrbass, Finalist in AP-S Student Paper Contest, 1996
- Tamer Ibrahim, ESL Outstanding Masters Thesis Award, 1999
- Tamer Ibrahim, Finalist in AP-S Student Paper Contest, 2000
- Tamer Ibrahim, ESL Outstanding Journal Paper Award, 2000
- Kwan Ho Lee, ESL Outstanding Technical Report Award, 2000
- Tamer Ibrahim, Best Paper Award, The International Society of Magnetic Resonance in Medicine Hardware Meeting, 2001
- Kwan Ho Lee, 1st Place in AMTA Student Paper Contest, 2002
- Kwan Ho Lee, 1st Place in AMTA Student Paper Contest, 2003
- Rodney Slone, ESL Outstanding Journal Paper Award, 2003
- Kishore Rama Rao, ESL Outstanding Journal Paper Award, 2004

Professional Activities:

- Member of the International Union of Radio Science (URSI) Commission B.
- Member of Electromagnetics Academy.
- Treasurer/Secretary, Columbus Chapter of the Joint IEEE APS/MTT Society, 1991 to June 1992.
- Vice Chairman, Columbus Chapter of the Joint APS/MTT Society, 1992 to June, 1993.
- Chairman Columbus Chapter of the Joint APS/MTT Society, 1993 to 1996.
- Short Course Chair for the ACES Symposium, 1994-1996.
- Program Committee Member of CEFC'98.

- Scientific Advisory Committee International Workshop on Finite Elements for Microwave Engineering, 1998-2006.
- Co-Conference Secretary for 5th International Workshop on Finite Elements for Microwave Engineering, 2000.
- Co-Editor for special issue on computational electromagnetics in the journal, Computer Methods in Applied Mechanics and Engineering, 1998.

Courses Developed:

- ECE 613 Antennas and Propagation for Wireless Systems: Senior Level Elective. The course will discuss how a cellular communication system works and the fundamentals of antennas such as gain, polarization, input impedance, and the Friis Transmission Formula. The propagation part of the course will include the study of reflection, diffraction and scattering of plane waves from typical structures in urban and rural environments. Propagation models will be presented for these environments based on theoretical, experimental, and statistical studies. These propagation models will be used to design the coverage of a typical cell site. The effects of multipath fading and diversity schemes to overcome those effects will be considered. The examples will emphasize the application to wireless systems such as cellular and PCS.
- ECE 813 Finite Methods for Electromagnetics: Graduate Level Course. Introduction to finite methods (finite element, finite volume, finite difference) from the viewpoint of someone doing research in electromagnetics or related fields.
- ECE 682 Senior Design Project: In this course, the students formed teams to design microstrip antenna arrays. During the course, they learned general antenna theory, microstrip antennas, and antenna arrays. They learned to use Ansoft HFSS to simulate the microstrip antenna arrays and then to build them. These designs were measured for impedance on the network analyzer and then measured for pattern and gain in the Compact Range.

Courses Taught:

- ECE 300 Electric Circuits Class for Non-EE's
- ECE 311 Field Theory I: Junior level EM course
- ECE 312 Field Theory II: Junior level EM course
- ECE 513 Field Theory III: Senior level EM course
- ECE 517 Electromagnetics Laboratory: Senior level course
- ECE 613 Antennas and Propagation for Wireless Systems: Senior level course
- ECE 682 Senior Design Course: Senior Level
- ECE 719 Electromagnetic Theory I: Graduate level course
- ECE 810 Electromagnetic Theory II: Graduate level course
- ECE 813 Finite Methods for Electromagnetics: Graduate level course

Book Chapters:

1. A.C. Cangellaris and R. Lee, "Solution of the two-dimensional Helmholtz equation using the bymoment method," *Integral Methods in Science and Engineering-90*, pp. 249-259, 1991.
2. R. Lee and A.C. Cangellaris, "Scattering from an arbitrary cylinder in the presence of a parallel planar media interface using the bymoment method," *Progress in Electromagnetic Research*, Vol. 4, Elsevier Science Pub., pp. 345-372, 1991.

Papers in Refereed Journals:

1. R. Lee, D.G. Dudley, and K.F. Casey, "Electromagnetic coupling by a wire through a circular aperture in an infinite planar screen," *J. of Electromagnetic Waves and Applications*, Vol.3, No.4, pp. 281-305, 1989.
2. R. Lee and D.G. Dudley, "Transient current propagation along a wire penetrating a circular aperture in an infinite planar conducting screen," *IEEE Trans. on Electromag. Compatibility*, Vol. 32, No. 2, pp. 137-143, May 1990.
3. D.B. Wright, R. Lee, and D.G. Dudley, "Transient current on a wire penetrating a cavity-backed circular aperture in an infinite screen," *IEEE Trans. on Electromag. Compatability*, Vol. 32, No. 3, pp. 197-204, August 1990.
4. A.C. Cangellaris and R. Lee, "The bymoment method for two-dimensional electromagnetic scattering," *IEEE Trans. Antennas and Propagat.*, AP-38, pp. 1429-1437, September 1990.
5. R. Lee and A.C. Cangellaris, "Application of the bymoment method to electromagnetic scattering from multiple cylinders," *Radio Science*, Vol. 25, No. 5, pp. 731-741, September 1990.
6. A.C. Cangellaris and R. Lee, "Finite element analysis of electromagnetic scattering from inhomogeneous cylinders at oblique incidence," *IEEE Trans. Antennas and Propagat.*, AP-39, pp. 645-650, May 1991.
7. D.B. Wright, R. Lee, D.G. Dudley, and K.F. Casey, "Scattering from a cavity-backed circular aperture penetrated by a wire," *IEEE Trans. Electromag. Compatability.*, Vol. 34, No. 2, pp. 133-136 May 1992.
8. R. Lee and A.C. Cangellaris, "A study of discretization error in the finite element approximation of wave solutions," *IEEE Trans. Antennas and Propagat.*, AP-40, pp. 542-549, May 1992.
9. A.C. Cangellaris and R. Lee, "On the accuracy of numerical wave simulations based on finite methods," *J. of Electromagnetic Waves and Applications*, vol. 6, no. 12, pp.1635-1653, 1992.
10. R. Lee and T.T. Chia, "Analysis of electromagnetic scattering from a cavity with a complex termination by means of a hybrid ray-FDTD method," *IEEE Trans. Antennas Propagat.*, AP-41, pp. 1560-1569, Nov. 1993.
11. R. Lee and V. Chupongstimun, "A partitioning technique for the finite element solution of electromagnetic scattering from electrically large dielectric cylinders," *IEEE Trans. Antennas Propagat.*, AP-42, pp. 737-741, May 1994.
12. J.O. Jevtic and R. Lee, "On the choice of metrons in the MEI method," *COMPEL -- Int. Journal Comp. and Math. in Electrical and Electronic Eng.*, Vol. 13, Supplement A, pp. 217-222, 1994.

13. J.O. Jevtic and R. Lee, "A theoretical and numerical analysis of the measured equation of invariance," *IEEE Trans. Antennas Propagat.*, AP-42, pp. 1097-1105, August 1994.
14. W.P. Pinello, R. Lee, and A.C. Cangellaris, "Finite element modeling of electromagnetic wave interactions with periodic structures," *IEEE Trans. Microwave Theory and Techniques*, MTT-42, pp. 2294-2301, December 1994.
15. U. Pekel and R. Lee, "An a posteriori error reduction scheme for the three dimensional finite element solution of Maxwell's equations," *IEEE Trans. Microwave Theory and Techniques*, MTT-43, pp. 421-427, February 1995.
16. J.O. Jevtic and R. Lee, "How invariant is the measured equation of invariance?," *IEEE Microwave and Guided Wave Letters*, Vol. 5, pp. 45-47, February 1995.
17. L. Hamandi, R. Lee, and F. Ozguner, "Review of domain decomposition methods for the implementation of FEM on massively parallel computers," *IEEE Antennas and Propagation Magazine*, February, 1995.
18. A. Bataineh, R. Lee, and F. Ozguner, "Electrical characterization of high-speed interconnects with a parallel three-dimensional finite difference time-domain algorithm," *SIMULATION*, Vol. 64, pp. 289-295, May 1995.
19. T.L. Barkdoll and R. Lee, "Finite element analysis of bodies of revolution using the measured equation of invariance," *Radio Science*, Vol. 30, No. 4, pp. 803-815 July/August 1995.
20. U. Pekel and R. Lee, "A 3-D application of the bymoment method for electromagnetic scattering," *Journal of Electromagnetic Waves and Application*, Vol. 9, pp. 973-992, July/August 1995.
21. T.T. Chia, R.J. Burkholder and R. Lee, "The application of FDTD in hybrid methods for cavity scattering analysis," *IEEE Trans. Antennas and Propagat.*, AP-43, pp.1082-1090, October 1995.
22. J.O. Jevtic and R. Lee, "An analytic characterization of the error in the measured equation of invariance," *IEEE Trans. Antennas and Propagat.*, AP-43, pp. 1109-1115, October 1995.
23. Z.S. Sacks, D.M. Kingsland, R. Lee, and J.F. Lee, "A perfectly matched anisotropic absorber for use as an absorbing boundary condition," *IEEE Trans. Antennas and Propagat.*, AP-43, pp. 1460-1463, December 1995.
24. J.W. Nehrbass, J.F. Lee, and R. Lee, "Stability analysis for perfectly matched layer absorber," *Electromagnetics*, Vol. 16, pp. 385-397, July/August 1996.
25. R. Lee, Z. Chen, J.O. Jevtic, and J.F. Lee, "Important considerations in the evaluation of absorbing boundary conditions," *Electromagnetics*, Vol. 16, pp.417-433, July/August 1996.
26. J.O. Jevtic and R. Lee, "Solenoidal edge elements," *Radio Science*, pp. 977-990, July/August 1996.
27. Y.S. Choi-Grogan, K. Eswar, P. Sadayappan, and R. Lee, "Sequential and parallel implementations of a partitioning finite element method," *IEEE Trans. Antennas and Propagat.*, AP-44, pp. 1609-1616, Dec. 1996.
28. J.Y. Wu, D.M. Kingsland, J.F. Lee, and R. Lee, "A comparison of anisotropic PML to Berenger's PML and its application to the finite element method for EM scattering," *IEEE Trans. Antennas and Propagat.*, AP-45, pp. 40-50, Jan. 1997.

29. J.F. Lee, R. Lee, and A.C. Cangellaris, "Time domain finite element methods," *IEEE Trans. Antennas and Propagat.*, AP-45, pp. 430-442, March 1997.
30. J.Y. Wu and R. Lee, "The advantages of triangular and tetrahedral edge elements for electromagnetic modeling with the finite element method," *IEEE Trans. Antennas and Propagat.*, AP-45, pp. 1431-1437. Sept. 1997.
31. J.W. Nehrbass, J.O. Jevtic, and R. Lee, "Reducing the phase error in finite difference methods without increasing the order," *IEEE Trans. Antennas and Propagat.*, AP-46, pp. 1194-1201, August 1998.
32. K. Rama Rao, J.W. Nehrbass, and R. Lee, "Discretization errors in finite methods: issues and possible solutions," *Computer Methods in Applied Mechanics and Engineering*, Vol. 169, pp. 219-236, 1999.
33. K. Rama Rao and R. Lee, "An optimal edge based finite difference solution to the vector Helmholtz equation in two dimensions," *IEEE Trans. Magnetics*, Vol. 35, pp. 1462-1465, May 1999.
34. E.M. Nassar, R. Lee, and J.D. Young, "A probe for determining the material properties of sea ice," *IEEE Trans. Antennas and Propagat.*, AP-47, pp.1085-1093, June 1999.
35. Y. Zhu and R. Lee, "TVFEM analysis of periodic structures for radiation and scattering," *Journal of Electromagnetics Waves and Applications*, Vol. 13, pp. 1679-1680, 1999.
36. A. Kangarlu, B.A. Baertlein, R. Lee, T. Ibrahim, L. Yang, A.M. Abduljalil, and P.M.L. Robitaille, "Dielectric resonance phenomena in ultra high field MRI," *Journal of Computer Assisted Tomography*, Vol. 23, pp. 821-831, November/December 1999.
37. J.Y. Wu, J.W. Nehrbass, and R. Lee, "A comparison of PML for TVFEM and FDTD," *Int. Journal of Numerical Modeling Electronics*, Vol. 13, pp. 233-244, March-June 2000.
38. R.D. Slone and R. Lee, "Applying Pade via Lanczos to the finite element method for electromagnetic radiation problems," *Radio Science*, Vol. 35, pp. 331-340, March-April 2000.
39. B.A. Baertlein, O. Ozbay, T.S. Ibrahim, R. Lee, Y. Yu, A. Kangarlu, and P.M.L. Robitaille, "Theoretical model for a MRI radio frequency resonator," *IEEE Trans. Biomedical Engineering*, Vol. 47, pp. 535-546, April 2000.
40. E.M. Nassar, J.T. Johnson, and R. Lee, "A numerical model for electromagnetic scattering from sea ice," *IEEE Trans. Geoscience and Remote Sensing*, Vol. 38, pp. 1309-1319, May 2000.
41. J.W. Nehrbass and R. Lee, "Optimal finite difference sub-gridding techniques applied to the Helmholtz equation," *IEEE Trans. Microwave Theory Tech.*, MTT-48, pp. 976-984, June 2000
42. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, P.M.L. Robitaille, "Application of finite difference time domain method for the design of birdcage RF head coils using multiport excitations," *Magnetic Resonance Imaging*, Vol. 18, pp. 733-742, July 2000.
43. T.S. Ibrahim, R. Lee, B.A. Baertlein, Y. Yu, and P.M.L. Robitaille, "Computational analysis of the high pass birdcage resonator: Finite difference time domain simulations for high-field MRI," *Magnetic Resonance Imaging*, Vol. 18, pp. 835-843, Sept. 2000.

44. T. S. Ibrahim, R. Lee, B. A. Baertlein, and P.-M. L. Robitaille, "B₁ Field Homogeneity and SAR Calculations in the High Pass Birdcage Coil," *Physics in Medicine and Biology*, Vol. 46, pp. 609-619, February 2001.
45. T. S. Ibrahim, R. Lee, A. M. Abduljalil, B. A. Baertlein, A. Kangarlu, R. Gilbert, and P.-M. L. Robitaille, "Dielectric resonances in UHFMRI: Computational Analysis and Experimental Findings," *Magnetic Resonance Imaging*, Vol. 19, pp. 219-226, Feb. 2001.
46. T. S. Ibrahim, R. Lee, A. M. Abduljalil, B. A. Baertlein, and P.-M. L. Robitaille, "Calculations of EM interactions with biological tissue: Magnetic resonance imaging at ultra high field," *Applied Computational Electromagnetics Journal*, Vol. 16, pp. 138-144, 2001.
47. C. C. Chen, K. Rama Rao, and R. Lee, "A Tapered-permittivity rod antenna for ground penetrating radar applications," *J. Applied Geophysics*, Vol. 47, pp. 309-316, July 2001.
48. R. D. Slone, R. Lee, and J. F. Lee, "Multipoint Galerkin asymptotic waveform evaluation for model order reduction of frequency domain FEM electromagnetic radiation problems," *IEEE Trans. Antennas and Propagat.*, AP-49, pp. 1504-1513, Oct. 2001.
49. T. S. Ibrahim, A. M. Abduljalil, B. A. Baertlein, R. Lee, and P. M. L. Robitaille, "Analysis of B₁ field profiles and SAR values for multi-strut transverse electromagnetic RF coils in high field MRI applications," *Physics in Medicine and Biology*, Vol. 46, pp. 2545-2555 Oct. 2001.
50. T. S. Ibrahim, R. Lee, and P.M.L. Robitaille, "Effect of RF coil excitation on field inhomogeneity at ultra high fields: a field optimized TEM resonator", *Magnetic Resonance Imaging*, Vol. 19, pp. 1339-1347, December 2001.
51. R.D. Slone, J.F. Lee, and R. Lee, "Automating multipoint Galerkin asymptotic waveform evaluation for a finite element fast frequency sweep," *IEEE Trans. Magnetics*, Vol. 38, pp. 637-640, March 2002.
52. R.D. Slone, J.F. Lee and R. Lee, "A comparison of some model order reduction techniques," *Electromagnetics*, Vol. 22, pp. 275-289, May-June 2002.
53. S.M Wang, F.L. Teixeira, R. Lee, and J.F. Lee, "Optimization of subgridding schemes for FDTD," *IEEE Microwave and Wireless Component Letters*, Vol. 12, pp. 223-225, June 2002.
54. Y. Srisukh, J. Nehrbass, F.L. Teixeira, J.F. Lee. and R. Lee, "An approach for automatic grid generation in three-dimensional FDTD simulations of complex geometries," *IEEE Ant Propagat. Mag.*, Vol. 44, pp.75-80, 2002.
55. C. C. Chen, K. Rama Rao, and R. Lee, "A new ultrawide-bandwidth dielectric-rod antenna for ground-penetrating radar applications," *IEEE Tran. Antenna Propagat.*, AP-51, pp. 371-377, March 2003.
56. S.C. Lee, J.F. Lee, and R. Lee, "Hierarchical vector finite elements for analyzing waveguiding structures" *IEEE Tran. Microwave Theory*, MTT-51, pp. 1897-1905, August 2003.
57. J. F. Lee, R. Lee, and R. J. Burkholder, "Loop star basis functions and a robust preconditioner for EFIE scattering problems," *IEEE Tran Antenna Propagat.*, AP-51, pp. 1855-1863, August 2003.

58. R. D. Slone, R. Lee, and J.F. Lee, "Well-conditioned asymptotic waveform evaluation for finite elements," *IEEE Tran Antenna Propagat.*, AP-51, pp. 2442-2447, Sep. 2003.
59. R. D. Slone, R. Lee, and J.F. Lee, "Broadband model order reduction of polynomial matrix equations using single-point well-conditioned asymptotic waveform evaluation: derivations and theory", *Int. J. Numer. Meth. Eng.*, Vol. 58, pp. 2325-2342, Dec 2003.
60. N. V. Venkatarayalu, C. C. Chen, F. L. Teixeira, and R. Lee, "Numerical modeling of ultrawide-band dielectric horn antennas using FDTD," *IEEE Tran. Antennas Propagat.*, Vol. 52, pp. 1318-1323, May 2004.
61. J. F. Lee, R. Lee, and F. Teixeira, "Hierarchical vector finite elements with p-type non-overlapping Schwarz Method for modeling waveguide discontinuities," *CMES-COMP MODEL ENG* 5 (5): 423-434 May 2004
62. K. H. Lee, C. C. Chen, F. L. Teixeira, and R. Lee, "Modeling and investigation of a geometrically complex UWB GPR antenna using FDTD," *IEEE Tran. Antennas Propagat.*, Vol. 52, pp. 1983-1991, Aug. 2004.
63. S. M. Wang, R. Lee, and F. L. Teixeira, "Implicit nonstaggered finite-difference time-domain method," *Microwave and Optical Tech. Letters*, Vol 45, pp. 317-319, May 2005
64. K. H. Lee, C. C. Chen, and R. Lee, "Novel dual-polarized tapered-chamber feed design concepts," *IEEE Antennas and Propagation Magazine*, Vol. 47, pp. 214-218, August 2005.
65. T. S. Ibrahim, C. Mitchell, P. Schmalbrock, R. Lee, and D. W. Chakeres, "Electromagnetic perspective on the operation of RF coils at 1.5-11.7 Tesla," *Magnetic Resonance in Medicine*, Vol. 54, pp. 683-690, Sept. 2005.
66. R. A. Chilton and R. Lee, "Chirping unit cell length to increase frozen mode bandwidth in non-reciprocal magnetic photonic crystals," *IEEE Trans. Microwave Theory Tech.*, Vol 54, pp. 473-480, Jan. 2006.
67. S. Wang, R. Lee, and F. L. Teixeira, "Anisotropic-medium PML for vector FETD with modified basis functions," *IEEE Trans. Antennas and Propagat.*, Vol. 54, pp. 20-27, Jan. 2006.
68. R. Lee, "A note on mass lumping in the finite element time domain method," *IEEE Trans. Antennas and Propagat.*, Vol. 54, pp. 760-762, Feb. 2006.
69. T.S. Ibrahim and R. Lee, "Evaluation of MRI RF probes utilizing infrared sensors," *IEEE Trans. Biomedical Eng.*, Vol. 53, pp. 963-967, May 2006.
70. K.H. Lee, C.C. Chen, and R. Lee, "UWB dual-linear polarization dielectric horn antennas as reflector feeds," *IEEE Trans. Antennas and Propagat.*, Vol. 55, pp. 798-804, March 2007
71. N.V. Venkatarayalu, R. Lee, Y.B. Gan, and L.W. Li, "A stable FDTD subgridding method based on finite element formulation with hanging variables, *IEEE Trans. Antennas and Propagat.*, Vol. 55, pp. 907-915, March 2007
72. R. Sharp, J. Adams, R. Machiraju, R. Lee and R. Crane, "Physics-based subsurface visualization of human tissue," *IEEE Trans. Visualization and Computer Graphics*, Vol. 13, pp.620-629, May/June 2007.

Conference Papers:

1. A.C. Cangellaris and R. Lee, "A finite-element method for solving electromagnetic scattering problems," IEEE Antennas Propagat. Symp. Digest, San Jose, CA, June 1989.
2. W. Pinello and R. Lee, "A finite element solution for electromagnetic scattering from an infinite periodic grating," IEEE Antennas Propagat. Symp. Digest, Chicago, IL, July 1992. Awarded 2nd Place in AP-S student paper contest.
3. R. Lee and T.T. Chia, "A hybrid ray/FDTD method for computing electromagnetic scattering from an engine cavity with a complex termination," 9th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 1993.
4. Y.S. Choi-Grogan, R. Lee, K. Eswar, and P. Sadayappan, "The performance of a partitioning finite element method on the Touchstone Delta," 10th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 1994.
5. A. Bataineh, R. Lee, and F. Ozguner, "Electrical characterization of high-speed interconnects with a parallel three-dimensional finite difference time-domain algorithm," High Performance Computing '94, Lajolla, CA, April 1994.
6. R. Lee and J.O. Jevtic, "Several approaches to improving the solution in the measured equation of invariance," IEEE Antennas Propagat. Symp. Digest, Seattle, WA, June 1994.
7. L. Hamandi, R. Lee, and F. Ozguner, "A domain decomposition technique for the parallel solution of linear systems of equations resulting from finite element discretization," International Conference on Electronic Circuits and Systems, Cairo, Egypt, December 1994.
8. L. Hamandi, F. Ozguner, and R. Lee, "The performance of the parallel solution of the Quasi-Minimal Residual (QMR) method for 2D mesh architectures," 11th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 1995.
9. R. Lee, "An overview of numerical dispersion error in PDE methods for electromagnetics," 12th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 1996.
10. Z. Chen and R. Lee, "Adaptive mesh refinement concepts for electromagnetics," 12th Annual Review of Progress in Applied Computational Electromagnetics, Monterey, CA, March 1996.
11. J. Nehrbass and R. Lee, "Stability analysis for perfectly matched absorbers," Joint AP-S Symposium and URSI Radio Science Meeting, Baltimore, MD, July 1996. Finalist for AP-S Student Paper Contest.
12. T.S. Ibrahim, Y. Yu, R. Lee, B.A. Baertlein, A. Kangarlu, and P.~Robitaille, "Finite difference time domain simulations for high-field MRI," Proc. ISMRM 6th Annual Meeting of International Society of Magnetic Resonance in Medicine, Sydney, Australia, April 1998.
13. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.M.L. Robitaille, "Magnetic field homogeneity and SAR issues for high-field MRI," Proc. ISMRM 6th Annual Meeting of International Society of Magnetic Resonance in Medicine, Sydney, Australia, April 1998.
14. B.A. Baertlein, O. Ozbay, T.S. Ibrahim, Y. Yu, X. Zang, R. Lee, A. Kangarlu, and P.M.L. Robitaille, "Theoretical model of the MRI TEM resonator," Proc. ISMRM 6th

Annual Meeting of International Society of Magnetic Resonance in Medicine, Sydney, Australia, April 1998.

15. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.M.L. Robitaille, "SAR and B₁ field homogeneity study at high-field MRI: 3T-9T," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
16. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.M.L. Robitaille, "Comparison between linear, quadrature, and 4-port excitations from 1.5 T to 4.7 T," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
17. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.M.L. Robitaille, "On the physical feasibility of achieving linear polarization at high field: A study of the birdcage coil," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
18. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.M.L. Robitaille, "3-Dimensional full wave analysis for MRI RF coils," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
19. R. Burgess, L. Yang, X. Zhang, T.S. Ibrahim, B.A. Baertlein, R. Lee, A.M. Abduljalil, A. Kangarlu, P.M.L. Robitaille, "Human Imaging at 8 Tesla," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
20. A. Kangarlu, L. Yang, B.A. Baertlein, A.M. Abduljalil, X. Zhang, T.S. Ibrahim, Y. Yu, R. Lee, and P.M.L. Robitaille, "Analysis of dielectric resonances at 8.0 Tesla," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
21. A.M. Abduljalil, A. Kangarlu, X. Zhang, Y. Yu, L. Yang, T.S. Ibrahim, R. Lee, B.A. Baertlein, R. Burgess, S. Bair, and P.M.L. Robitaille, "A quantum leap in human magnetic resonance: Imaging at 8.0 Tesla," Proc. ISMRM 7th Annual Meeting of International Society of Magnetic Resonance in Medicine, Philadelphia, PA, May 1999.
22. R.D. Slone and R. Lee, "Matrix Pade via Lanczos for FEM problems", IEEE Antennas Propagat. Symp. Digest, Orlando, FL, July 1999.
23. T.S. Ibrahim, R. Lee, B.A. Baertlein, A. Kangarlu, and P.-M.L. Robitaille, "Dielectric resonance in ultra high field MRI," Proc. ISMRM 8th Annual Meeting of International Society of Magnetic Resonance in Medicine, Denver, Colorado, USA, April 2000.
24. T.S. Ibrahim, R. Lee, B.A. Baertlein, and P.-M.L. Robitaille, "FDTD numerical comparison of multi-strut TEM resonators," Proc. ISMRM 8th Annual Meeting of International Society of Magnetic Resonance in Medicine, Denver, Colorado, USA, April 2000.
25. T.S. Ibrahim, R. Lee, B.A. Baertlein, and P.-M.L. Robitaille, "Accurate SAR and B₁ field calculations using high resolution head models," Proc. ISMRM 8th Annual Meeting of International Society of Magnetic Resonance in Medicine, Denver, Colorado, USA, April 2000.

26. C.C. Chen, K. Rama Rao and R. Lee, "A modified ultra-wide bandwidth dielectric rod antenna", Eighth International Conference on Ground Penetrating Radar, Sydney, Australia, May 2000.
27. K. Rama Rao, C.C. Chen, R. Lee and K. O'Neill, "A comparison of scattering characteristics of UXO and non-UXO objects in the presence of a water table", The UXO/Countermines Forum, Anaheim, CA, May 2000.
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2. R. Lee and A.C. Cangellaris, "Electromagnetic scattering from multiple cylinders using the bymoment method," URSI Radio Science Meeting, Boulder, CO, January 1990.
3. D.B. Wright, R. Lee, D.G. Dudley and K.F. Casey, "Scattering from a cavity-backed circular aperture penetrated by a wire: The Exterior Region," URSI Radio Science Meeting, Boulder, CO, January 1990.
4. A.C. Cangellaris and R. Lee, "Plane wave scattering from material cylinders at oblique incidence using the bymoment method," URSI Radio Science Meeting, Dallas, TX, May 1990.
5. R. Lee and A.C. Cangellaris, "Scattering from an arbitrary cylinder in the presence of a planar media interface using the bymoment method: Part one, theory," URSI Radio Science Meeting, Dallas, TX, May 1990.
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7. A.C. Cangellaris and R. Lee, "Solution of the two-dimensional Helmholtz equation using the bymoment method," IMSE Conference, Arlington, TX, June 1990.
8. R. Lee and A.C. Cangellaris, "Finite element analysis for an obliquely incident plane wave incident on cylinders near a planar media interface," URSI Radio Science Meeting, London, Ontario, June 1991.
9. R. Lee, "A study of discretization errors in the finite element method," URSI Radio Science Meeting, London, Ontario, June 1991.
10. Y.S. Choi, R. Lee, and R.C. Chou, "A one-dimensional study of the effect of boundary conditions on discretization error for FEM," URSI Radio Science Meeting, Chicago, IL, July 1992.
11. U. Pekel and R. Lee, "An element-by-element a posteriori error estimation and improvement approach for the finite element analysis of three-dimensional electromagnetic boundary value problems," URSI Radio Science Meeting, Chicago, IL, July 1992.
12. R.C. Chou, T.T. Chia and R. Lee, "The energy flow inside a waveguide cavity using the SBR and GRE methods," URSI Radio Science Meeting, Chicago, IL, July 1992.
13. J.O. Jevtic and R. Lee, "Higher order divergenceless edge elements," URSI Radio Science Meeting, Ann Arbor, MI, June 1993.
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67. Y. Srisukh and R. Lee, "P-refinement for the finite element time domain method," Electromagnetic Code Consortium Meeting, Wright Patterson Air Force Base, May 2005.
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70. N.V. Venkatarayalu, R. Lee, G.Y. Beng, and L.W. Li, "Time domain finite element solution using hanging Variables on rectangular edge elements," URSI Radio Science Meeting, Washington DC, July 2005.
71. Y. Srisukh, R. Lee, N. Venkatarayalu, and Y.B. Gan, "Use of Hanging Variables in the Time Domain for Adaptive Refinement and Subgridding," 8th Workshop on Finite Elements for Microwave Engineering - Antennas, Circuits and Devices, Stellenbosch, South Africa, May 2006.
72. C. Kung and R. Lee, "A Time-Domain Hybrid Finite Difference/Finite Element Method for Anisotropic Materials," URSI Radio Science Meeting, Albuquerque, NM, July 2006.
73. R.A. Chilton, C.C. Chen, and R. Lee, "Further Developments of a Novel Dual-Linear Polarized UWB Tapered Chamber Feed," URSI Radio Science Meeting, Albuquerque, NM, July 2006.
74. R.A. Chilton and R. Lee, "FDTD Subgridding Based Upon the Finite Element "Hanging Variable" Concept," URSI Radio Science Meeting, Albuquerque, NM, July 2006.

Other Publications:

1. J.O. Jevtic and R. Lee, "Reply to comments on, A theoretical and numerical analysis of the measured equation of invariance," *IEEE Trans. Antennas and Propagat.*, AP-43, pp. 1170-1171, October 1995.
2. J.O. Jevtic and R. Lee, "Reply to comments on, How invariant is the measured equation of invariance," *IEEE Microwave and Guided Wave Letters*, Vol.5, p.417, November 1995.

Ph.D. Dissertations Supervised:

1. "Parallel Logic and Interconnection Simulation Algorithms for High-Speed Digital Circuits," Abdulla Bataineh, January 1992 (Co-advised with Prof. Fusun Ozguner).
2. "A Three-Dimensional Finite Element Method Approach for the Analysis of Electromagnetic Scattering," Umit Pekel, February 1993.
3. "Application of FDTD in Hybrid Methods for EM Scattering Analysis of Cavities with Complex Terminations," Tse-Tong Chia, June 1994.

4. "Parallel Algorithms for the Finite Element Method on the Mesh Architecture," Lama Hamandi May, 1995 (Co-advised with Prof. Fusun Ozguner).
5. "Advances in Finite Difference Methods for Electromagnetic Modeling," John Nehrbass, December 1996.
6. "Modeling Electromagnetic Wave Problems Using Tangentially Continuous Vector Finite Element Method," Jo-Yu Wu, March 1997.
7. "Numerical and Experimental Studies of Electromagnetic Scattering from Sea Ice," Elias Nassar, December 1997 (Co-advised with Prof. Joel Johnson).
8. "Development of New Vector Finite Element Methods for Electromagnetics," Jovan Jevtic, December 1999.
9. "Fast Frequency Sweep Model Order Reduction of Polynomial Matrix Equations Resulting from Finite Element Discretizations," Rodney Slone, June 2002 (Co-advised with Professor Jin-Fa Lee).
10. "Design of Radio Frequency Coils for Magnetic Resonance Imaging Applications: A Computational Electromagnetics Approach," Tamer Ibrahim, December 2002.
11. "Improved accuracy algorithms for time domain finite methods in electromagnetics," Shumin Wang, September 2003 (Co-advised with Prof. Fernando Teixeira).
12. "Development of Four Novel UWB Antennas Assisted by FDTD Method," Kwan Ho Lee, December 2004.
13. "Modeling and Design of Resonators for Electron Paramagnetic Resonance Imaging and Ultra High Field Magnetic Resonance Imaging," Anca Stefan, December 2005.
14. "Development of Hybrid Explicit/Implicit and Adaptive h and p Refinement for the Finite Element Time Domain Method," Yudhapoom Srisukh, December 2005.
15. "Computational approaches for diffusive light transport: Finite elements, grid adaptation, and error estimation," Richard Sharp, August 2006 (Co-advised with Prof. Raghu Machiraju).

Masters Theses Supervised:

1. "A Finite Element Partitioning Scheme for EM Scattering of an Electrically Large Cylinder," Veera Chupongstimun, December 1992.
2. "Finite Element Analysis of Bodies of Revolution using MEI Boundary Conditions," Ty Barkdoll, September 1993.
3. "A Sequential and Parallel Implementation of a Partitioning Finite Element Technique for Electromagnetic Problems," Yung Shirley Choi-Grogan, December 1993.
4. "An Analysis of the Measured Equation of Invariance," Jovan Jevtic, May 1994.
5. "A Parallel Automatic Grid Generator for the Finite Difference Time Domain Method," Roger Prenger, July 1995.
6. "Adaptive Mesh Refinement for Laplace's Equation," Li Chen, July 1995.
7. "Investigation of Different Error Mechanisms in FEM for Electromagnetics," Zhong Chen, September 1996.
8. "Optimal Edge-Based Finite Difference Methods," Kishore Rama Rao, September 1998.
9. "Finite difference time domain simulations of ultra high-field magnetic resonance imaging in medicine," Tamer Ibrahim, October 1998.

10. "Analysis of Periodic Structures for Scattering and Radiation Using Tangentially Continuous Vector Finite Element Method," Yu Zhu, October 1998.
11. "Modeling of Horn-Fed Bow Tie Antenna," N.V. Venkataraylu, June 2002.
12. "An Analytical and Numerical Investigation of Unidirectional Magnetic Photonic Crystals," Ryan Chilton, June 2005.
13. "Dynamic Characterization of Mechanical, Optical, and Physiological Properties for Cancer Detection," Abdul Rana, December 2006
14. "A Coupled Electromagnetic-Thermal Model of Heating during Radiofrequency Ablation," Jake Adams, August 2007

Non-Thesis Masters Supervised:

1. Juan Torres, June 2006
2. Khaled Jazzar, June 2006