ROBERT G. OLSEN

EDUCATION

B.S.E.E.	–	Rutgers University	1968
M.S.E.E.	–	University of Colorado	1970
Ph.D.	–	University of Colorado	1974

EXPERIENCE

Engineer: Summer 1968
Radio WOR, New York City

Senior Engineer: 1971–1973
Westinghouse Georesearch Laboratories, Boulder, CO

NSF Faculty Fellow: February–August 1980
GTE Laboratories, Waltham, MA

Visiting Scientist: August 1984–May 1985
ASEA Research Laboratories, Västerås, Sweden

Visiting Professor: Summer 1990
Technical University of Denmark, Lyngby, Denmark

Visiting Scientist: August 1997--July 1998
Electric Power Research Institute, Palo Alto, CA

Assistant Professor: 1973–1978
School of Electrical Engineering and Computer Science
Washington State University, Pullman, WA 99164-2752

Associate Professor: 1978–1983
School of Electrical Engineering and Computer Science
Washington State University, Pullman, WA 99164-2752

Professor: 1983–Present
School of Electrical Engineering and Computer Science
Washington State University, Pullman, WA 99164-2752

Boeing Distinguished Professor in Electrical Engineering: 1993–Present
School of Electrical Engineering and Computer Science
Washington State University, Pullman, WA 99164-2752

Associate Dean for Undergraduate Programs/Student Services: 2003–Present
College of Engineering and Architecture
Washington State University, Pullman, WA 99164-2752

HONORS AND AWARDS

- Fellow of the IEEE
- Honorary Life Membership, IEEE Electromagnetic Compatibility Society
- Kauffman Award for outstanding contributions to entrepreneurship education
- Graduated with highest honors from Rutgers

- NDEA fellowship for graduate study at University of Colorado
- Outstanding Professor (Electrical Engineering Department), 1986–87
- Research Excellence Award (College of Engineering) 1989
- IEEE Power Engineering Society Working Group Recognition Award 1989
- IEEE Spokane Section Engineer of the Year Award 1991
- IEEE Power Engineering Society Working Group Recognition Award 1992
- Listed in Who's Who in Engineering Education

HONORARY SOCIETIES

- Eta Kappa Nu
- Tau Beta Pi
- Sigma Xi
- Phi Kappa Phi

PATENTS

1. US Patent No. 5,662,031 Title: "Continuous Flow Electrical Treatment of Flowable Food Products" Inventors: Bai-Lin Qin, Gustavo Barbosa-Canovas, Barry Swanson, Patrick Pedrow, Robert Olsen, and Qinghua Zhang

2. US Patent No. 6,995,574 Title: "Measurement of a coating on a composite using capacitance" Inventors: Sergoyan, Edward G; Jackson, Kirk; Olsen, Robert G.

3. US Patent No. 7,135,869 Title: "Thickness measuring system and methods using a cavity resonator" Inventors: Sergoyan, Edward G; Jackson, Kirk; Olsen, Robert G.

JOURNAL PUBLICATIONS

[1] R. G. Olsen and D. C. Chang, "Input Impedance Change of a Half-Wave Vertical Antenna Over a Dissipative Earth," *IEEE Trans. on Antennas and Propagation*, Vol. AP-19, No. 5, pp. 685–686, September 1971.

[2] R. G. Olsen and A. J. Farstad, "Electromagnetic Direction-Finding Experiments for Location of Trapped Miners," *IEEE Trans. on Geoscience Electronics*, Vol. GE-11, No. 4, pp. 178–185, October 1973.

[3] R. G. Olsen and D. C. Chang, "Current Induced by a Plane Wave on a Thin Infinite Wire Near the Earth," *IEEE Trans. on Antennas and Propagation*, Vol. AP-22, No. 4, pp. 586–589, July 1974.

[4] R. G. Olsen and D. C. Chang, "New Modal Representation of Electromagnetic Waves Supported by a Horizontal Wire Above Dissipative Earth," *Electronics Letters*, Vol. 10, No. 7, pp. 92–94, 4 April 1974.

[5] D. C. Chang and R. G. Olsen, "Excitation of an Infinite Antenna Above a Dissipative Earth," *Radio Science*, Vol. 10, Nos. 8-9, pp. 823–832, August–September 1975.

[6] R. G. Olsen, "A Theoretical Investigation of Microwave Irradiation of Seeds in Soil," *Journal of Microwave Power*, Vol. 10, No. 3, September 1975.

[7] R. G. Olsen and D. C. Chang, "Analysis of Semi-Infinite and Finite Thin-Wire Antennas Above a Dissipative Earth," *Radio Science*, Vol. 11, No. 11, pp. 867–874, November 1976.

[8] R. G. Olsen, G. A. Geithman and D. H. Schrader, "A Microwave Irradiation Chamber for Scientific Studies on Agricultural Products," *IEEE Trans. on Microwave Theory and Techniques*, Vol. MTT-25, No. 5, pp. 428–433, May 1977.

[9] R. G. Olsen and M. A. Usta, "The Excitation of Current on an Infinite Horizontal Wire Above Earth by a Vertical Electric Dipole," *IEEE Trans. on Antennas and Propagation*, Vol. AP-25, No. 4, pp. 560–565, July 1977.

[10] E. F. Kuester, D. C. Chang and R. G. Olsen, "Modal Theory of Long Horizontal Wire Structures Above the Earth, 1, Excitation," *Radio Science*, Vol. 13, No. 4, pp. 605–613, July-August 1978.

[11] R. G. Olsen, E. F. Kuester and D. C. Chang, "Modal Theory of Long Horizontal Wire Structures Above the Earth, 2, Properties of Discrete Modes," *Radio Science*, Vol. 13, No. 4, pp. 615–623, July-August 1978.

[12] J. Daffe and R. G. Olsen, "An Integral Equation Technique for Solving Rotationally Symmetric Electrostatic Problems in Conducting and Dielectric Material," *IEEE Trans. Power Apparatus and Systems*, Vol. PAS-98, No. 5, pp. 1609–1616, September-October 1979.

[13] R. G. Olsen, J. Daffe and C. F. Sarkinen, "On the Origin, Significance and Minimization of Non-Uniform Contamination Along HVDC Insulator Strings," *IEEE Trans. Power Apparatus and Systems*, Vol. PAS-100, No. 3, pp. 971–980, March 1981.

[14] R. G. Olsen and A. Aburwein, "Current Induced on a Pair of Wires Above Earth by a Vertical Electric Dipole for Grazing Angles of Incidence," *Radio Science*, Vol. 15, No. 4, pp. 733–742, July-August 1980.

[15] R. G. Olsen and D. C. Chang, "Reply to `New Representation for the Current in a Horizontal Wire Above Ground,'" *Electronics Letters*, Vol. 15, No. 18, pp. 556–557, 30 August 1979.

[16] R. G. Olsen and A. Aburwein, "LORAN-C Positioning Errors Caused by Scattering from Wires Above the Earth," *IEEE Trans. Electromagnetic Compatibility*, Vol. EMC-24, No. 4, pp. 381–388, November 1982.

[17] R. G. Olsen and T. A. Pankaskie, "On the Exact, Carson and Image Theories for Wires At or Above the Earth's Interface," *IEEE Trans. on Power Apparatus and Systems*, Vol. PAS-102, No. 3, pp. 769–774, March 1983.

[18] G. L. Hower, R. G. Olsen, L. D. Philipp and J. E. Staley, "A Method for Predicting the Response to Three Dimensional Defects in Eddy-Current NDE," *Materials Evaluation*, Vol. 40, pp. 1362–1366, December 1982.

[19] R. G. Olsen, "Radio Noise Fields Generated by Corona Streamers on a Power Line," *Radio Science*, Vol. 18, No. 3, pp. 399–408, May-June 1983.

[20] R. G. Olsen, "A Simple Model for Weakly Coupled Lossy Transmission Lines of Finite Length," *IEEE Trans. on Electromagnetic Compatibility*, Vol. EMC-26, pp. 79–83, May 1984.

[21] R. G. Olsen and K. C. Jaffa, "Electromagnetic Coupling from Power Lines and Magnetic Field Safety Analysis," *IEEE Trans. on Power Apparatus and Systems*, Vol. PAS-103, No. 12, pp. 3595–3607, December 1984.

[22] R. G. Olsen and D. Rouseff, "On the Wave Impedance for Power Lines," *IEEE Trans. on Power Apparatus and Systems*, Vol. PAS-104, No. 3, pp. 711–717, March 1985.

[23] R. G. Olsen and D. Rouseff, "Radio Noise Fields Generated by Corona Streamers on a Power Line Above Dissipative Earth," *Radio Science*, Vol. 20, No. 3, pp. 601–610, May-June 1985.

[24] R. G. Olsen, "Integral Equations for Electrostatics Problems with Thin Dielectric or Conducting Layers," *IEEE Trans. on Electrical Insulation*, Vol. EI-21, No. 4, pp. 565–573, August 1986.

[25] R. G. Olsen, "Radio Noise Due to Corona on a Multiconductor Power Line Above a Dissipative Earth," *IEEE Trans. on Power Delivery*, Vol. PWRD-3, pp. 272–287, January 1988.

[26] R. G. Olsen and O. Einarsson, "Boundary Element Methods for Weakly Three Dimensional Quasi-Electrostatics Problems," *IEEE Trans. on Power Delivery*, Vol. PRWD-2, No. 4, pp. 1276–1284, October 1987.

[27] R. G. Olsen, "The Magnetic Field Environment of Electric Power Lines," Invited Paper at the 1986 IEEE Winter Power Meeting (New York) in the Panel Session of Biological Effects of Power Frequency Electric and Magnetic Fields, *IEEE Special Publication 86TH0139-6 PWR.*

[28] R. G. Olsen and B. Stimson, "Predicting VHF/UHF Electromagnetic Noise from Corona on Power Line Conductors," *IEEE Transactions on Electromagnetic Compatibility*, Vol. EMC-30, pp. 13–22, February 1988.

[29] R. G. Olsen, G. L. Hower and P. D. Mannikko, "A Hybrid Method for Combining Quasi-Static and Full Wave Techniques for Electromagnetic Scattering Problems," *IEEE Trans. on Antennas and Propagation*, Vol. 36, pp. 1180–1184, August 1988.

[30] R. G. Olsen and M. Wu, "High Frequency Propagation Losses on an Open Wire Transmission Line Above Dissipative Earth," *IEEE Trans. on Broadcasting*, Vol. BR-34, pp. 292–300, June 1988.

[31] R. G. Olsen, R. S. Baishiki and D. Deno (principal authors), "Magnetic Fields from Electric Power Lines--Theory and Comparison to Measurements," *IEEE Trans. on Power Delivery*, Vol. 3, No. 4, pp. 2127–2136, October 1988.

[32] R. G. Olsen and M. Wu, "A Wideband Model for Electromagnetic Interference from Corona on Electric Power Lines," *Radio Science*, Vol. 24, No. 3, pp. 340–350, May-June 1989.

[33] R. G. Olsen and P. D. Mannikko, "Validation of the Hybrid Quasi-Static/Full-Wave Method for Capacitively Loaded Thin-Wire Antennas," *IEEE Transactions on Antennas and Propagation,* Vol. 38, No. 4, pp. 516–522, April 1990.

[34] M. Wu, R. G. Olsen and S. W. Plate, "Wideband Approximate Solutions for the Sommerfeld Integrals Arising in the Wire Over Earth Problem," *Journal of Electromagnetic Waves and Applications*, Vol. 4, No. 6, pp. 479–504, 1990.

[35] R. G. Olsen, T. Bracken, V. Chartier, T. Dovan, K. Jaffa, M. Misakian, J. Stewart, "An Evaluation of Instrumentation Used to Measure A-C Power System Magnetic Fields," *IEEE Trans. on Power Delivery*, Vol. 6, No. 1, pp. 373–383, January 1991.

[36] R. G. Olsen and M. Wu, "A Wideband Model for Electromagnetic Interference from Corona on Multiconductor Power Lines," *Radio Science*, Vol. 26, No. 1, pp. 73–88, January-February 1991.

[37] R. G. Olsen and B. A. Vanhoff, "Validation of Homogenization Theory for Calculating the Electrical Constants of Composite Materials," *Journal of Applied Physics*, Vol. 69, No.4, pp. 2497–2503, 15 February 1991.

[38] R. G. Olsen, S. D. Schennum and V. L. Chartier, "Comparison of Several Methods for Calculating Power Line Electromagnetic Interference Levels and Calibration with Long Term Data," *IEEE Transactions on Power Delivery*, Vol. 7, No. 2, pp. 903–913, April 1992.

[39] K. Nagasawa and R. G. Olsen, "Characteristics of Dielectric Material with Holes in Region of Microwave Band," *Journal of the College of Engineering, Nihon University*, Vol. 32, pp. 129–134, March 1991.

[40] R. G. Olsen, D. C. James and V. L. Chartier, "The Performance of Reduced Magnetic Field Power Lines: Theory and Measurements on an Operating Line," *IEEE Trans. on Power Delivery*, Vol. 8, No. 7, pp. 1430-1442, July 1993.

[41] R. G. Olsen and P. Wong, "Characteristics of Electromagnetic Fields in the Vicinity of Electric Power Lines," *IEEE Trans. on Power Delivery*, Vol. 7, No. 10, pp. 2046–2055, October 1992.

[42] G. L. Hower, R. G. Olsen, J. D. Earls and J. B. Schneider, "Inaccuracies in Numerical Calculation of Scattering Near Natural Frequencies of Penetrable Objects," *IEEE Trans. on Antennas and Propagation*, Vol. 41, pp. 982-987, July 1993.

[43] R.G. Olsen, "Power Transmission Electromagnetics," *IEEE Antennas and Propagation Society Magazine*, Vol. 36, No. 6, pp. 7-16, December 1994

[44] S. D. Schennum and R. G. Olsen, "A Method for Calculating Wide Band Electromagnetic Interference from Power Line Corona," *IEEE Trans. on Power Delivery*, Vol. 10, pp. 1535-1540, July 1995

[45] R.G. Olsen, S.L. Backus and R.D. Stearns, "Development and Validation of Software for Predicting ELF Magnetic Fields Near Power Lines," *IEEE Trans. on Power Delivery*, Vol. 10, pp. 1525-1534, July 1995

[46] R.G. Olsen and M.C. Willis, "A Comparison of Exact and Quasi-Static Methods for Evaluating Grounding Systems at High Frequencies, *IEEE Trans. on Power Delivery,* Vol. 11, pp. 1071-1081, April 1996

[47] M.L. Hiles, R.G. Olsen, K.C. Holte, D.R. Jensen and K.L. Griffing, "Power Frequency Magnetic field Management Using a Combination of Active and Passive Shielding Technology," *IEEE Trans. on Power Delivery,* Vol. 13, pp. 171-179, January 1998 (10 citations)

[48] D.B. Spencer, P.D. Pedrow, R. G. Olsen, G.V. Barbosa-Canovas and B.G. Swanson, "Space Charge Evolution in Dilute Binary Electrolytes Exposed to High Voltage Transients," *IEEE Trans. on Dielectrics and Electrical Insulation,* Vol. 3, pp. 747-753, December 1996

[49] B.L. Qin, G.V. Barvbosa-Canovas, B.G. Swanson, P.D. Pedrow and R.G. Olsen, "Inactivating Microorganisms Using a Pulsed Electric Field Continuous Treatment System," *IEEE Trans. on Industry Applications,* Vol. IA-34, pp. 43-50, January/February 1998

[50] R.G. Olsen and C.E. Lyon, "Modeling of Extremely Low Frequency Magnetic Field Sources Using Multipole Techniques, *IEEE Trans. on Power Delivery,* Vol. 11, pp.1563-1570, July 1996

[51] G. Tanyer and R. G. Olsen, "High Frequency Scattering by a Conducting Circular Cylinder Coated with a Lossy Dielectric of Non Uniform Thickness," *IEEE Trans. on Antennas and Propagation,* Vol. 45, pp. 689-697, April 1997

[52] D. H. Monteith and R. G. Olsen, "Radiation Due to a Convex Curvature Discontinuity of a Dielectric Coated Perfect Conductor," *IEEE Trans. on Antennas and Propagation,* Vol. 46, pp. 1220-1228, August 1998

[53] R.G. Olsen, "Power Transmission Electromagnetics," *URSI Radioscientist* , No. 277, pp. 29-38, June 1996

[54] R.G. Olsen and P. Moreno, "Some Observations about Shielding Extremely Low Frequency Magnetic Fields by Finite Width Shields," *IEEE Trans. on Electromagnetic Compatibility,* Vol. 38, pp. 460-468, August, 1996

[55] P. Moreno and R.G. Olsen, "A Simple Theory for Optimizing Finite Width ELF Magnetic Field Shields for Minimum Dependence on Source Orientation," *IEEE Trans. on Electromagnetic Compatibility,* Vol. EMC-39, pp. 340-348, November 1997

[56] L.L. Frasch, S. McLean and R.G. Olsen, "Electrical Properties of Dry and Water Saturated Basalt Rock, 1GHz - 100 GHz," *IEEE Trans. on Geoscience and Remote Sensing* , Vol. GRS-36, pp. 754-766, May 1998

[57] R.G. Olsen and G.L Heins, "A Study of the Electromagnetic Compatibility of High Voltage Transmission Lines and the Guidance of Center Pivot Irrigation Units with Cornering Systems," *IEEE Trans. on Power Delivery,* Vol. PWRD-13, pp. 1230-1237, October 1998

[58] R.E. Bruhn, P.D. Pedrow, R.G. Olsen, G. V. Barbosa-Canovas and B. G. Swanson, "Electrical Environment Surrounding Microbes Exposed to Pulsed Electric Fields," *IEEE Transactions on Dielectrics and Electrical Insulation,* Vol. 4, pp. 806-812, December 1997.

[59] R. E. Bruhn, P.D. Pedrow, R.G. Olsen, G. V. Barbosa-Canovas and B. G. Swanson, "Heat Conduction in Microbes Exposed to Pulsed Electric Fields," *IEEE Transactions on Dielectrics and Electrical Insulation*, Vol. 5, pp. 878-885, December 1998

[60] R.G. Olsen, "An Improved Model for the Electromagnetic Compatibility of All Dielectric Self Supporting Fiber Optic Cable and High Voltage Power Lines," *IEEE Trans. on Electromagnetic Compatibility*, Vol. 41, No. 3, August, 1999, pp 180 – 192

[61] W. Young, B. Belzer, and R.G. Olsen, "A Two Element Antenna for Null Suppression in Multipath Environments," *IEEE Transactions on Antennas and Propagation* Vol. 48, No. 8 , pp 1161-1174, August 2000

[62] R.G. Olsen and W.T. Kaune, "Comments on 'Fields and Currents in the Organs of the Human body When Exposed to Power Lines and VLF Transmitters" *IEEE Transactions on Biomedical Engineering*, Vol. 46, No. 6, June, 1999. pp. 760-762

[63] M.W. Tuominen and R.G. Olsen, "Electrical Design of All-Dielectric Self-Supporting Optical Fiber Cable," *IEEE Transactions on Power Delivery*, Vol. PWRD-15, No. 3, pp. 940-947, July 2000

[64] R.G. Olsen, J.L. Young and D.C. Chang, "Electromagnetic Wave Propagation on a Thin Wire Above Earth," *IEEE Transactions on Antennas and Propagation*, Vol. 48, pp. 1413-1419, September 2000

[65] D.B. Phillips, R.G. Olsen and P.D. Pedrow, "Corona Onset as a Design Optimization Criterion for High voltage Electrodes," *IEEE Transactions on Dielectrics and Electrical Insulation*, Vol. TDEI-7, pp. 744-751, December 2000

[66] J. M. Silva and R. G. Olsen, "Use of Global Positioning System (GPS) Receivers Under Power Line Conductors," IEEE *Transactions on Power Delivery*, Vol PWRD-17, pp. 938-944, October 2002

[67] R. G. Olsen and K. S. Edwards, "A New Method to Measure High Voltage Transmission Line Conductor Sag," *IEEE Transactions on Power Delivery*, Vol. PWRD-17, pp. 1142 – 1151, October 2002

[68] K.S. Edwards, P.D. Pedrow and R.G. Olsen, "Portable ADSS Surface Contamination Meter Calibrated in a High Voltage Environment," *IEEE Transactions on Power Delivery*, Vol. PWRD-18, pp. 888-894, July 2003

[69] R. G. Olsen, M. Istenic and P. Zunko, "On Simple Methods for Calculating ELF Shielding of Infinite Planar Shields," *IEEE Transactions on Electromagnetic Compatibility*, Vol. EMC-45, pp. 538 – 547, August 2003

[70] J. W. Rockway, J. C. Logan and R. G. Olsen, "EMC Applications for Expert MININEC," *IEEE EMC Society Newsletter*, Spring 2003

[71] R. Kavet, R. G. Olsen and L. Zafanella, "The EMF Health Issue: New Insights to the Possible Link with Leukemia," IEEE *Power and Energy Magazine*, Vol. 1, No. 6, November/December 2003, pp. 79-80

[72] K. Yamazaki and R. G. Olsen, "Application of a Corona Onset Condition to Calculation of Corona Onset Voltage of Stranded Conductors," *IEEE Trans. on Dielectrics and Electrical Insulation*, Vol. 11, No. 4, pp. 674-680, August 2004.

[73] M. Istenic and R. G. Olsen, "A Simple Hybrid Method for ELF Shielding of Imperfect Finite Planar Shields," IEEE *Trans. on Electromagnetic Compatibility*, Vol. 46, No. 2 May 2004, pp 199 – 207

[74] R. G. Olsen and K. Yamazaki, "The Interaction Between ELF Electric Fields and RF Survey Meters: Theory and Experiment," *IEEE Transactions on Electromagnetic Compatibility*, pp. 86-96, Vol. 47, No. 1, February 2005

[75] R. G. Olsen and R. A. Tell, "Evaluation of High Voltage Protective Hoods in Strong Radiofrequency Fields," *IEEE Transactions on Power Delivery*, pp. 340-346, Vol. 22, No. 1, January, 2007

[76] R. G. Olsen, R. A. Tell, and H. K. Westby, Interaction Between Power Frequency Electric Fields and RF Survey Meters: Test Protocol and Evaluation of Commercial Meters, *IEEE Transactions on Power Delivery*, pp. 2508 – 2516, Vol. 22, No. 4, October 2007

[77] Jian Wang, Robert G. Olsen, Zhongwei Tang, Juming Tang, "Influence of Mashed Potato Dielectric Properties and Circulating Water Electrical Conductivity on Radio Frequency Heating," *Journal of Microwave Power and Electromagnetic Energy*, pp. 31 - 46, Vol. 42, No. 2, May 2008

[78] W. O. Price, J. Drapala, D. V. Thiel and R. G. Olsen, "Corona Onset at 60 Hz and at High Frequency for an Isolated, Cylindrical Electrode," *IEEE Transactions on Electromagnetic Compatibility*, pp. 476-484, Vol. 50, No 3, August 2008

[79] Y. Kobayashi, M. Moeller, G. Karady, G. Heydt and R. G. Olsen, "The Utilization of Satellite Images to Identify Tree Trimming Needs for Overhead Transmission Lines," *IEEE Transactions on Power Delivery*, pp. 1703-1709, Vol. 24, No. 3. July 2009

[80] Y. Xia, D. M. Sullivan, Z, Li and R. G. Olsen, "Long-Distance Underwater ELF Simulation Using a Near-to-Far Field Transformation," *IEEE Antennas and Wireless Propagation Letters*, pp. 498-501, Vol. 8, 2009

[81] P. Moreno, and R. G. Olsen, "A Method for Estimating Magnetic Shielding by 2-D Thick Planar Plates for Distribution Systems Shielding, *IEEE Transactions on Power Delivery*, pp. 2710-2716, Vol 25, October 2010

[82] R. G. Olsen, R. A. Tell and J. Schneider, "Radiofrequency Burns in the Power System Workplace," *IEEE Transactions on Power Delivery*, pp. 352-359, Vol 26, January 2011

[83] R.G. Olsen and Z., Li, "A Simple Up-over-and-down Model for Low Frequency Horizontal Electric Dipole Propagation Near an Interface," submitted to the *IEEE Transactions on Antennas and Propagation*

[85] R. Kavet, R. A. Tell and R. G. Olsen, "Radiofrequency (RF) Contact Currents: Sensory Responses and Dosimetry," *Radiation Protection Dosimetry. in press*

[86] R. A. Tell and R. G. Olsen, "RF Burn Mechanisms and their Relation to Hazards," submitted to the *IEEE Transactions on Electromagnetic Compatibility*

[87] Benjamin D. Braaten, Robert M. Nelson, Robert G. Olsen, Yuxin Feng and Maqsood A. Mohammed, "EFIE for Problems with Electrically Small Lossy Regions and Validation with a Real Ferrite Bead," in preparation

BOOKS AND BOOK CHAPTERS

[1] R. G. Olsen, "Electromagnetic Characteristics of Horizontal and Vertical Wires Over a Dissipative Half-Space," Ph.D. Thesis, University of Colorado, 1974.

[2] R. G. Olsen and D. A. Rogers, "Propagation in Optical Fibers," Published in the book *Fiber Optics*, J. Daly (Ed.), CRC Press, 1984.

[3] R. G. Olsen and P. D. Mannikko, "Validation of the Hybrid Quasi-Static/Full-Wave Method for Capacitively Loaded Thin-Wire Antennas," Reprinted in *Computational Electromagnetics*, E.K. Miller, Medgyesi,-Mitschang and E.H. Newman (Eds.), IEEE Press, New York, 1991.

[4] R.G. Olsen, "Power Line Electric and Magnetic Fields," McGraw Hill Yearbook of Science and Technology, pp. 167-168, 1997

[5] D.T. Patten, O.P. Ghandi, T. Getty, W.E. Gordon, J.W. Hastings, P. Kareiva, J.C. Lin, R.G. Olsen, J. Pastor, B.J. Rathcke, A. Sastre, L.A. Shepp, "An Evaluation of the U.S. Navy's Extremely Low Frequency Communications System Ecological Monitoring Program," National Academy Press, 1997

[6] R. G. Olsen and V. L. Chartier, "Electromagnetic Interference," Chapter in the Book, *EPRI AC Transmission Line Reference Book – 200 kV and Above, Third Edition,* 2004

[7] R. G. Olsen and T. D. Bracken, "Shared Use of the Right-of-Way" Chapter in the Book, *EPRI AC Transmission Line Reference Book – 200 kV and Above, Third Edition,* 2004

FULL LENGTH REFEREED CONFERENCE PAPERS

[1] R. G. Olsen, B. C. Furumasu and D. P. Hartmann, "Contamination Mechanisms for HVDC Insulators," 1977 Winter PES Symposium, New York, NY, Paper No. A 77 035-9.

[2] R. G. Olsen and J. Daffe, "The Effect of Electric Field Modification and Wind on the HVDC Insulation Contamination Process," 1978 Winter IEEE PES Symposium, New York, NY, Paper No. A 78-120-8.

[3] F. H. Raab and R. G. Olsen, "Detection of Loran C Anomalies Caused by Man Made Structures," Seventh Annual Wild Goose Assn. Symposium, New Orleans, LA, 1978.

[4] R. G. Olsen and J. D. Reeves, "A Simple Model for Weakly Coupled Lossy Transmission Lines of Finite Length Located Above a Grounded Dielectric Slab," Proceedings of the 1987 IEEE EMC Meeting, Atlanta, GA, pp. 272–278.

[5] R. G. Olsen and V. L. Chartier, "Recent Advances in Modeling and Measurement of Electromagnetic Interference from Electric Power Lines," Invited Paper at the *1987 Study Committee 36 CIGRE Colloquium*, Montreal, Canada, June 1987.

[6] R. G. Olsen, "Recent Advances in Modeling and Measurement of Electromagnetic Interference from Electric Power Lines," Invited Paper at the NSF sponsored USA-Japan Seminar on the "Electromagnetic Interference in Highly Advanced Social Systems," Honolulu, HI, August 1988.

[7] H. L. Collins and R. G. Olsen, "One Dimensional Methods for Calculation of Fields and Ions in Wind Near an HVDC Transmission Line," Accepted by the Sixth International Symposium on High Voltage Engineering, New Orleans, LA, 1989 (withdrawn).

[8] N. S. Dogan, M. Wu, M. Osman and R. G. Olsen, "Modeling of Propagation and Cross-Talk in Interconnects Using SPICE," 33rd Midwest Symposium on Circuits and Systems, Calgary, Alberta, Canada, 1990.

[9] P. Waller, L. G. Geissinger, V. L. Chartier, and R. G. Olsen, "Electric and Magnetic Field Reduction and Research: A Report to the Washington State Legislature," Proceedings of the 1993 American Power Conference, Chicago, IL.

[10] R. G. Olsen, "Electromagnetic Fields from Power Lines," 1993 IEEE International Symposium on Electromagnetic Compatibility, Dallas, TX.

[11] J. L. Young and J. B. Schneider and R. G. Olsen, "Laplace's Equation and the Measured Equation of Invariance, 1993 COMPUMAG Conference, Miami, FL.

[12] R. G. Olsen, "Models for Predicting Electromagnetic Interference from Corona on Power Lines," CIGRE Conference on Power System Electromagnetic Compatibility, Lausanne, Switzerland, October 1993.

[13] S.G. Tanyer and R.G. Olsen, “High Frequency Scattering by a conducting Circular Cylinder Coated with a Lossy Dielectric of Non Uniform Thickness- TE Case,” presented at the 1994 Applied Computational Electromagnetics Society Conference, Monterrey, CA

[14] D.H. Monteith and R.G. Olsen, “Radiation Due to a Convex Curvature Discontinuity of a Dielectric Coated Perfect Conductor,” presented at the 1994 Applied Computational Electromagnetics Society Conference, Monterrey, CA

[15] S.D. Schennum and R.G. Olsen, “A Multipole Model for Coupling between Electrical Discharges and Wires,” presented at the 1994 Japan U.S. Science Seminar on Electromagnetic Field Effects Caused by High Voltage Systems , Sapporo, Japan

[16] R.G. Olsen and V.L. Chartier, “The Performance of Reduced Magnetic Field Power Lines: Theory and Measurements on an Operating Line,” presented at the 1994 Japan U.S. Science Seminar on Electromagnetic Field Effects Caused by High Voltage Systems , Sapporo, Japan

[17] B.L. Qin, G.V. Barvbosa-Canovas, B.G. Swanson, P.D. Pedrow and R.G. Olsen, "A Continuous Treatment System for Inactivating Microorganisms with Pulsed Electric Fields," Conference Record of the 1995 IEEE Industry Applications Annual Meeting, Orlando, FL

[18] P.D. Pedrow and R.G. Olsen, "Corona Streamer Onset as an Optimization Criterion for Design of High Voltage Hardware on Transmission Lines," presented at the 1995 High Voltage Workshop of the IEEE Dielectrics and Electrical Insulation Society. (also the 1996 IEEE International Symposium on Electrical Insulation

[19] R.G. Olsen and P. Moreno, "A Simple Method for Analyzing the Shielding of Extremely Low Frequency Magnetic Fields by Shields of Finite Extent," EMC 96' ROMA, October, 1996

[20] R.E. Bruhn, P.D. Pedrow, R.G. Olsen, B.G. Swanson and G.V. Barbosa-Canovas, "Space Charge Near Microbes During Pulsed Electric Field Pasteurization of Liquid Foods," the 1996 IEEE International Symposium on Electrical Insulation

[21] R.G. Olsen, D.B. Phillips and P.D. Pedrow, "Extrapolation of a Corona Streamer Onset Criterion to General Convex Conductor Surfaces," 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[22] P.D. Pedrow, D.B. Phillips, R.G. Olsen and K.S. Myers, "Trichel Pulse Statistics as a Measure of AC Corona Performance for Two Dimensional Electrode Structures in Dry Air," 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[23] P. Moreno and R.G. Olsen, "A Simple Model for Minimizing Source Orientation Dependence of Finite Width ELF Magnetic Field Shields," 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[24] R.G. Olsen, "Recent Developments in the ELF Electric and Magnetic Field Environment Issue, " Invited paper at the 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[25] R.G. Olsen, "On Low Frequency Shielding of Electromagnetic Fields," Invited tutorial paper at the 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[26] R.G. Olsen, **"**Power Transmission Line Electromagnetic Compatibility," Invited tutorial paper at the 10th International Symposium on High Voltage Engineering, Montreal, August 1997

[27] R.G. Olsen, "Calculations of ELF Electric and Magnetic fields in Air," Invited paper to the Dept. of Energy EMF Engineering Review Symposium, Charleston, SC April 1998

[28] R.G. Olsen and P. Moreno, "On the Accuracy of Approximate Methods for Calculating ELF Shielding Effectiveness of Infinite Planar Shields," EMC 98' ROMA, September, 1998

[29] R.G. Olsen and P. Moreno, "A Simple Model for Calculating Penetration of ELF Magnetic Fields Through Apertures in Planar Shields," EMC 98' ROMA, September, 1998

[30] R.G. Olsen, "An Improved Model for Studying Dry Band Arcing on All Dielectric Self Supporting Fiber Optic Cable Located Near High Voltage Power Lines," EMC 98' ROMA, September, 1998

[31] W. Young, B. Belzer, and R.G. Olsen, "A Field Diversity Antenna for Portable Phones," 1998 *IEEE APS Conference on Antennas and Propagation for Wireless Communications,* November 1998

[32] R. Bruhn, P. Pedrow, R. Olsen, G. V. Barbosa-Canovas, and B. G. Swanson, "Electrical Charge Distribution Surrounding Microorganisms Suspended in Foods Exposed to Pulsed Electric Fields," Paper #59C-11, Institute of Food Technologists, Annual Meeting, June 20-24, 1998, Atlanta, Georgia.

[33] R.G. Olsen, "Laboratory Simulation of Dry Band Arcing on All-Dielectric Self-Supporting Fiber Optic Cable Near High Voltage Power Lines, presented at the 1999 IEEE EMC Society Symposium, Seattle, WA

[34] K.S. Edwards, P.D. Pedrow, and R.G. Olsen, "Portable ADSS Surface contamination Meter," Proceedings of the 1999 IEEE Conference on Electrical Insulation and Dielectric Phenomena, Volume I, 1999, pp. 158-161.

[35] K.S. Edwards, and R. G. Olsen, "Safety Aspects of ADSS Cable Installations on High Voltage Transmission Lines," North American Power Symposium, Tempe AZ, October 2002

[36] M. Istenic and R. G. Olsen A Simple Hybrid Method for Calculating the Magnetic Field Shielding of 2D Conductors of Finite Width," 15th International Zurich Symposium on EMC, February 2003

[37] F.M. Tesche, B.A. Renz, R.M. Hayes, and R.G. Olsen, "Development and Use of a Multiconductor Line Model for PLC Assessments," 15th International Zurich Symposium on EMC, February 2003

[38] M. Istenic and R. G. Olsen, Frequency Dependence of Magnetic field Shielding by finite planar shields. Presented at the 2003 IEEE Electromagnetic Compatibility Society Symposium, Istanbul, Turkey, May 2003

[39] R. G. Olsen, "Technical considerations for Wideband Power Line Communication – A Summary, Presented at the 2003 IEEE Electromagnetic Compatibility Society Symposium, Istanbul, Turkey, May 2003

[40] R. G. Olsen, "Space Potential Probes for Real-Time Monitoring of Conductor Sag and Average Core Temperature," Presented at the North American Power Symposium, Moscow, Idaho, August 2004

[41] R. G. Olsen "Technical considerations for Broadband Powerline (BPL) Communication," Presented at the 2005 Zurich Symposium on Electromagnetic Compatibility, Zurich, Switzerland, February 2005

[42] D. Klinect, D. Nichols, B. Mehraban, S. Sebo, L. Xu, X. Liu, B. Cramer, M. Silva, R. Olsen, Jerry Ramie, "Electromagnetic Noise Emission Measurements Near the FACTS Device at the Inez (AEP) Station," Presented at the 2005 Zurich Symposium on Electromagnetic Compatibility, Zurich, Switzerland, February 2005

[43] R. Olsen, J. Ramie, B. Cramer, M. Silva, S. Sebo, L. Xu, X. Liu, D. Klinect, D. Nichols, "Limits Applied to Electromagnetic Noise Emission Measurements Near

FACTS Devices," Presented at the 2005 PowerTech Conference, St. Petersburg, Russia, June 2005

[44] D. Klinect, D. Nichols, S. Sebo, L. Xu, X. Liu, B. Cramer, M. Silva, R.Olsen, J. Ramie "Electromagnetic Noise Emission Measurements Near the Flexible AC Transmission System (FACTS) Device at the Sullivan (TVA) Station," Presented at the 2005 PowerTech Conference, St. Petersburg, Russia, June 2005

[45] R. G. Olsen, "Harold Frank Engineering Entrepreneurship Institute," presented at the June 2006 American Society of Engineering Education Meeting in Chicago

[46] W. O. Price, J. Drapala, D. V. Thiel, and R. G. Olsen, "Corona Onset voltage at 60 Hertz for an Isolated Cylindrical Electrode," presented at the 2006 IEEE EMC Symposium in Portland, OR.

[47] Robert G. Olsen, Ashley Ater-Kranov, and Laura Girardeau, "A Direct Method for Assessing ABET Professional Skills in Engineering Programs," Pacific Northwest Section American Society for Engineering Education Meeting, Pullman, WA, April 2007

[48] Ater-Kranov, Ashley, Carl Hauser, Robert G. Olsen and Laura Girardeau, "A Direct Method for Assessing ABET Professional Skills in Engineering Programs," American Society for Engineering Education Meeting, Pittsburgh, PA, June 2008 – Best paper award for the conference out of 1400 papers.

[49] Loveless-Morris, J, Mody, P., Embrey, R, Kuwada, K, Mendoza, M, Olsen, R. G. and Riskin, E, "Challenges and Benefits of Running a Multi-Institutional Recruitment," American Society for Engineering Education Meeting, Pittsburgh, PA, June 2008

[50] R.G. Olsen, "Engaging Alumni in Engineering Entrepreneurship: The Harold Frank Institute," National Collegiate Inventors and Innovators Alliance Conference, Washington DC, March 2009

[51] R. G. Olsen, "Recent Developments in the Harold Frank Engineering Entrepreneurship Institute," American Society for Engineering Education Meeting, Austin, TX, June 2009

[52] R. G. Olsen, A. Ater-Kranov and K. Reinkens, "Experience with the College-Wide Transition from Paper to On-Line Course Evaluations, 2011 ASEE International meeting, Vancouver, BC, June 2011

[53] N. Klingbeil, R. G. Olsen and others "The Wright State Model for Engineering Mathematics Education: Highlights from a CCLI Phase 3 Initiative, Volume 2, 2011 ASEE International meeting, Vancouver, BC, June

[54] R. T. Rebich, J. L. Young, C. L. Wagner and R. G. Olsen, "Comparison of the Up-Over-Down Approximation with the Quasi-Electrostatic Approximation for ELF Fields in Layered Media," 2011 IEEE APS International Symposium, Spokane, WA, 2011

[55] D. Kushal, N Mohan, X. Deng, R. Gorur and R. G. Olsen, "Analyzing Techniques for Increasing Power Transfer in the Electric Grid," 2012 North American Power Symposium, University of Illinois at Urbana-Champaign, IL Technical Paper Prize

BOOK REVIEWS AND NON-REVIEWED ARTICLES

[1] R. G. Olsen, Electromagnetics at Washington State University, IEEE Antennas and Propagation Newsletter, Vol. 31, No. 5. pp. 13–15, October 1989.

[2] R. G. Olsen, Review of "Advanced Engineering Electromagnetics by C. A. Balanis" *IEEE Antennas and Propagation Newsletter*, Vol. 31, No. 6, December 1989.

CONFERENCE PRESENTATIONS

[1] R. G. Olsen and D. C. Chang, "Input Impedance Change of a Half-Wave Vertical Antenna Over a Dissipative Earth," Presented at the 1970 IEEE-GAP Symposium, Ohio State University, Columbus, OH.

[2] R. G. Olsen and D. C. Chang, "Multi-Reflection of Current on a Long Horizontal Wire Over a Conducting Half-Space," 1971 URSI/USNC Fall Meeting, UCLA, Los Angeles, CA.

[3] R. G. Olsen and A. J. Farstad, "Electromagnetic Direction-Finding Experiments for Location of Trapped Miners," Presented at the 1973 IEEE-GAP Symposium, University of Colorado, Boulder, CO.

[4] R. G. Olsen and D. C. Chang, "New Modal Representation of Electromagnetic Waves Supported by a Horizontal Wire Above Dissipative Earth," Presented at the 1974 URSI Symposium on Electromagnetic Wave Theory, London, England.

[5] D. C. Chang, J. R. Wait and R. G. Olsen, "Propagation Characteristics of a Horizontal Conducting Wire Located Above or Buried in the Earth," 1974 URSI/USNC Symposium, Georgia Institute of Technology, Atlanta, GA.

[6] R. G. Olsen, "A Theoretical Investigation of Microwave Irradiation of Seeds in Soil," presented at the Northwest Regional Meeting - AGU, Richland, WA.

[7] R. G. Olsen and D. C. Chang, "Analysis of Semi-Infinite and Finite Thin-Wire Antennas Above a Dissipative Earth," Presented at the 1974 URSI/USNC Symposium, Georgia Institute of Technology, Atlanta, GA.

[8] R. G. Olsen and D. C. Chang, "Propagation of Modes on a Pair of Infinite Wires Above a Conducting Earth," 1975 IEEE-APS Symposium, University of Illinois, Urbana, IL.

[9] R. G. Olsen and M. A. Usta, "The Excitation of Current on an Infinite Horizontal Wire Above Earth by a Vertical Electric Dipole," Presented at the 1976 IEEE APS Symposium, University of Massachusetts, Amherst, MA.

[10] G. S. Barta and R. G. Olsen, "A Short Range VLF Navigation System for Rivers and Harbors," 1977 IEEE APS Symposium, Stanford University, Palo Alto, CA.

[11] J. Daffe and R. G. Olsen, "An Integral Equation Technique for Solving Rotationally Symmetric Electrostatic Problems in Conducting and Dielectric Material," Presented at the 1979 Winter IEEE PES Meeting, New York, NY.

[12] R. G. Olsen and N.A. Sanford, "The Influence of a Borehole on the Mutual Impedance of an Array of Coplanar Loops," 1979 Spring USNC/URSI Symposium, Seattle, WA.

[13] R. G. Olsen, J. Daffe and C. F. Sarkinen, "On the Origin, Significance and Minimization of Non-Uniform Contamination Along HVDC Insulator Strings," Presented at the 1979 Summer IEEE PES Meeting, Vancouver, Canada.

[14] R. G. Olsen and A. Aburwein, "Current Induced on an Infinite Horizontal Wire Near the Earth by a Distant VED Located on the Earth's Surface," 1979 Fall USNC/URSI Symposium, Boulder, CO.

[15] R. G. Olsen and A. Aburwein, "Current Induced on a Pair of Wires Above Earth by a Vertical Electric Dipole for Grazing Angles of Incidence," Presented at the 1979 Fall USNC/URSI Symposium, Boulder, CO.

[16] R. G. Olsen and A. Aburwein, "Induced Current on an Infinite Horizontal Wire Above Earth by a Cloud to Ground Lightning Discharge," 1980 North American Radio Science Meeting, Quebec, Canada.

[17] R. G. Olsen and A. Aburwein, "LORAN-C Positioning Errors Caused by Scattering from Wires Above the Earth," Presented at the 1982 URSI/USNC Symposium, University of New Mexico, Albuquerque, NM.

[18] R. G. Olsen and T. A. Pankaskie, "On the Exact, Carson and Image Theories for Wires At or Above the Earth's Interface," Presented at the 1982 Summer IEEE PES Meeting, San Francisco, CA.

[19] R. G. Olsen, "Quasi-Electrostatic Field Inside a Hemispherical Shell on the Earth Near a Power Line," Presented to the AC Fields Working Group at the 1983 Winter Meeting of the IEEE Power Engineering Society.

[20] R. G. Olsen, "Radio Noise Fields Generated by Corona Streamers on a Power Line," Presented at the 1983 IEEE APS Symposium, University of Houston, Houston, TX.

[21] R. G. Olsen, "A Simple Model for Weakly Coupled Lossy Transmission Lines of Finite Length," Presented at the 1983 URSI/USNC Symposium, University of Houston, Houston, TX.

[22] R. M. Nelson and R. G. Olsen, "Potential Calculations for Floating Conductors with Axial Symmetry," 1984 Annual Meeting of the North Dakota Academy of Sciences, Fargo, ND.

[23] R. G. Olsen and K. C. Jaffa, "Electromagnetic Coupling from Power Lines and Magnetic Field Safety Analysis," Presented at the 1984 Winter PES Meeting, Dallas, TX.

[24] R. G. Olsen and D. Rouseff, "On the Wave Impedance for Power Lines," Presented at the 1984 Summer IEEE PES Meeting, Seattle, WA.

[25] R. G. Olsen, "Effects of Grounds," Invited Presentation in the Panel Discussion, "Grounding Practices for Mitigation of Induced Currents and Voltages," Presented at the 1984 IEEE PES Summer Meeting, Seattle, WA.

[26] R. G. Olsen, "Radio Noise Due to Corona on a Multiconductor Power Line Above a Dissipative Earth," Presented at the 1986 National Radio Science Meeting, Boulder, CO.

[27] R. G. Olsen, "The Magnetic Field Environment of Electric Power Lines," Invited Paper at the 1986 IEEE Winter Power Meeting (New York) in the Panel Session of Biological Effects of Power Frequency Electric and Magnetic Fields.

[28] R. G. Olsen, "Radio Noise Due to Corona on a Multiconductor Power Line Above a Dissipative Earth," Presented at the 1986 Summer IEEE PES Meeting, Mexico City, Mexico.

[29] R. G. Olsen and B. Stimson, "Predicting VHF/UHF Electromagnetic Noise from Corona on Power Line Conductors," Presented at the 1987 National Radio Science Meeting, Boulder, CO.

[30] R. G. Olsen and O. Einarsson, "Boundary Element Methods for Weakly Three Dimensional Quasi-Electrostatics Problems," Presented at the 1987 Winter IEEE PES Meeting, New Orleans, LA.

[31] R. G. Olsen, G. Ellis and E. F. Kuester, "Scattering from a Two Dimensional Strip Using the Bivariational Method with a Physical Optics Trial Function," Presented at the 1988 National Radio Science Meeting, Boulder, CO.

[32] P. D. Mannikko and R. G. Olsen, "Implementation of a Hybrid Method for Combining Full Wave and Quasi-Static Methods in Antenna Problems," Presented at the 1988 National Radio Science Meeting, Boulder, CO.

[33] R. G. Olsen, R. S. Baishiki and D. Deno (principal authors), "Magnetic Fields from Electric Power Lines–Theory and Comparison to Measurements," Presented at the 1988 Winter IEEE PES Meeting, New York, NY.

[34] R. G. Olsen and M. D. Wu, "A Wideband Model for Electromagnetic Interference from Corona on Electric Power Lines," Presented at the 1989 National Radio Science Meeting, Boulder, CO.

[35] R. G. Olsen and P. D. Mannikko, "Validation of the Hybrid Quasi-Static/Full-Wave Method for Capacitively Loaded Thin-Wire Antennas," Presented at the 1989 National Radio Science Meeting, Boulder, CO.

[36] T. A. Pankaskie and R. G. Olsen, "Application of Watson's Transformation to Scattering from a Conducting Cylinder Coated with an Anisotropic Dielectric," Presented at the 1989 URSI Radio Science Meeting, San Jose, CA.

[37] R. G. Olsen, "A Monte Carlo Method for Calculating the Statistics of the Magnetic Field Near a Power Line," Presentation to the IEEE AC Field Effects Working Group, New York, 1989.

[38] R. G. Olsen and M. Wu, "A Wideband Model for Electromagnetic Interference from Corona on Multiconductor Power Lines," Presented at the 1990 National Radio Science Meeting, Boulder, CO.

[39] R. G. Olsen and B. Vanhoff, "Validation of Homogenization Theory for Calculating the Electrical Constants of Composite Materials," Presented at the 1990 National Radio Science Meeting, Boulder, CO.

[40] R. G. Olsen, "EMF on Transmission and Distribution Lines," presented at the 1990 Pacific Power Engineering Seminar, Portland, OR.

[41] T. A. Pankaskie and R. G. Olsen, "The Application of Watson's Transform to Scattering From an Anisotropically Coated Cylinder," Presented at the 1990 URSI Meeting, Dallas Texas.

[42] R. G. Olsen et. al., "An Evaluation of Instrumentation Used to Measure AC Power System Magnetic Fields," Presented at the 1990 IEEE Summer Power Meeting, Minneapolis, MN.

[43] R. G. Olsen, "Sources of Power Frequency Magnetic Fields," Presented at the 1990 IEEE Summer Power Meeting, Minneapolis, MN.

[44] R. G. Olsen, "Unsolved Problems in the Electrostatics of Thin Dielectric Layers," Presented at the 1991 ICIAM Meeting, Washington D.C.

[45] D. H. Monteith and R. G. Olsen, "Radiation Due to a Convex Curvature Discontinuity of a Dielectric Coated Perfect Conductor," 1991 URSI Meeting, University of Waterloo, Ontario, Canada.

[46] R. G. Olsen, "Power Line Electromagnetic Fields (EMF): A Brief Tutorial," Presented at the 1991 Annual Convention of the Washington Association of Cities, Spokane, WA.

[47] R. G. Olsen, S. D. Schennum and V. L. Chartier, "Comparison of Several Methods for Calculating Power Line Electromagnetic Interference Levels and Calibration with Long Term Data," Presented at the 1991 IEEE Transmission and Distribution Conference, Dallas, TX.

[48] R. G. Olsen, "Sources of Power Frequency Magnetic Fields," Presented at the 1991 IEEE Transmission and Distribution Conference, Dallas, TX.

[49] R. G. Olsen, "Methods for Predicting Levels of Conductor Related Corona Phenomena from AC Transmission Lines," Presented at the 1991 IEEE Transmission and Distribution Conference, Dallas, TX.Compatibility

[50] R. G. Olsen, "Characteristics of Low Frequency Electromagnetic Fields in the Home and Workplace Environment," Presented at the 1991 American Law Firm Association Conference, Los Angeles, CA.

[51] R. G. Olsen, "EMF Physics Refresher," Presented at the 1991 EPRI EMF Science and Communication Symposium, San Jose, CA.

[52] R. G. Olsen, "Sources of Electric and Magnetic Fields and Elementary Field Theory," Presented at the Washington State EMF Symposium - Recycling Electric and Magnetic Fields Associated with Power Lines, Seattle, WA, 10th September 1991.

[53] R. G. Olsen, "What is EMF?," Presented at the EMF Workshop Program, Sponsored by the Institute for Science and Society, Ellensburg, WA, 8th November 1991.

[54] R. G. Olsen, "The Electromagnetic Environment of Power Lines," Presented at the 1992 National Radio Science Meeting, Boulder, CO.

[55] G. L. Hower, R. G. Olsen and J. E. McPherson, "On Resonance Effects in Scattering from Hollow Non-Conducting Objects," Presented at the 1992 National Radio Science Meeting, Boulder, CO.

[56] R. G. Olsen, D. C. James and V. L. Chartier, "The Performance of Reduced Magnetic Field Power Lines: Theory and Measurements on an Operating Line," Presented at the 1992 IEEE Winter Power Meeting, New York, NY.

[57] R. G. Olsen and P. Wong, "Characteristics of Electromagnetic Fields in the Vicinity of Electric Power Lines," Presented at the 1992 IEEE Winter Power Meeting, New York, NY.

[58] R. G. Olsen, "What is EMF?," A presentation to the Washington State House Energy Committee, Olympia, WA, 16th January 1992.

[59] R. G. Olsen, "Magnetic Field Measurement Protocols," A presentation to the EPRI End Use Magnetic Field R&D Workshop, Sonoma, CA, 10th February 1992.

[60] R. G. Olsen, "Introduction to ELF Electric and Magnetic Fields," A presentation to the course, "ELF Electric and Magnetic Fields: Occupational and Environmental Health Concerns," Sponsored by the Northwest Center for Occupational Health and Safety, University of Washington, Seattle, WA, 12th March 1992.

[61] R. G. Olsen, "Electromagnetic Field Effects," Presented at the student panel session, 1992 IEEE PES Summer Meeting, Seattle, WA.

[62] R. G. Olsen, "EMF Physics Refresher," Presented at the 1992 EPRI EMF Sciences and Communication Symposium, San Francisco, CA, 13th October 1992.

[63] R. G. Olsen, "What is EMF?," A presentation at the 1992 Washington School Directors Association Meeting, 20th November 1992.

[64] S. D. Schennum and R. G. Olsen, "Mulitpole Model for Coupling Between Corona Discharges and Wires," 1993 National Radio Science Meeting, Boulder, CO.

[65] S. G. Tanyer and R. G. Olsen, "High Frequency Scattering by a Conducting Circular Cylinder Coated with a Dielectric of Non Uniform Thickness," Presented at the 1993 URSI Radio Science Meeting, Ann Arbor, MI.

[66] J. L. Young, J. B. Schneider, and R. G. Olsen, "Theoretical Aspects on the Measured Equation of Invariance," Presented at the 1993 URSI Radio Science Meeting, Ann Arbor, MI.

[67] R. G. Olsen, "Professorship Program at WSU," Presented at the University of Technology, Malaysia Symposium on Industry/University Interaction, Kuala Lumpur, April 1993.

[68] G. Tanyer and R. G. Olsen, "High Frequency Scattering by a Conducting Circular Cylinder Coated with a Lossy Dielectric of Non Uniform Thickness," presented at the 1994 IEEE Antennas and Propagation Symposium, Seatte, WA

[69] D. H. Monteith and R. G. Olsen, "Radiation Due to a Convex Curvature Discontinuity of a Dielectric Coated Perfect Conductor," Presented at the 1994 URSI Radio Science Meeting, Seattle, WA

[70] T.A. Pankaskie and R.G. Olsen, "Suppression of Creeping Waves on Coated Cylinders by Anisotropic Coating," Presented at the 1994 URSI Radio Science Meeting, Seattle, WA

[71] S. D. Schennum and R. G. Olsen, "A Method for Calculating Wide Band Electromagnetic Interference from Power Line Corona," Presented at the 1994 IEEE Power Engineering Society Summer Meeting, San Francisco, CA

[72] R.G. Olsen, S.L. Backus and R.D. Stearns, "Development and Validation of Software for Predicting ELF Magnetic Fields Near Power Lines," Presented at the 1994 IEEE Power Engineering Society Summer Meeting, San Francisco, CA.

[73] R.G. Olsen and M.C. Willis, "A Comparison of Exact and Quasi-Static Methods for Evaluating Grounding Systems at High Frequencies, Presented at the 1995 IEEE Power Engineering Society Summer Meeting, Portland, OR

[74] M.L. Hiles, R.G. Olsen, K.C. Holte, D.R. Jensen and K.L. Griffing, "Power Frequency Magnetic field Management Using a Combination of Active and Passive Shielding Technology," Presented at the 1995 IEEE Power Engineering Society Summer Meeting, Portland, OR

[75] R.G. Olsen and C.E. Lyon, "Modeling of Extremely Low Frequency Magnetic Field Sources Using Multipole Techniques, Presented at the 1995 IEEE Power Engineering Society Summer Meeting, Portland, OR

[76] R.G. Olsen, "Transmission Line Design and Environmental Effects, NSF Workshop on Electric Power Systems Infrastructure, Washington State University, October 1994

[77] R.G. Olsen and G.L Heins, "A Study of the Electromagnetic Compatibility of High Voltage Transmission Lines and the Guidance of Center Pivot Irrigation Units with Cornering Systems," Presented at the 1998 IEEE Power Engineering Society Winter Meeting, Portland, OR

[78] R.G. Olsen, "Calculations of ELF Electric and Magnetic fields in Air," Invited paper to the Dept. of Energy EMF Engineering Review Symposium, Charleston, SC April 1998

[79] R.G. Olsen, J.L. Young and D.C. Chang, "Electromagnetic Wave Propagation on a Thin Wire Above Earth," 2000 National Radio Science Meeting, Boulder, CO.

[80] R. G. Olsen, "Recent Developments in the ELF Electric and magnetic Field Health Effects Issue" Seminar in Japan presented in Nagoya and Tokyo Summer 2001

[81] R. G. Olsen, "Satellite Imaging Technology for the Power System," EPRI Overhead Transmission Line Equipment, Inspection & Maintenance Practices Conference, Monterey, CA, May, 2002

[82] R. G. Olsen, "Electromagnetic Compatibility Regulations and Wideband Powerline Communication," EMI, Power Quality and Safety Workshop, Georgia Institute of Technology, April, 2002

[83] R. G. Olsen, "Technical considerations for Wideband Power Line Communication – A Summary, Presented at the 2002 IEEE Power Engineering Society Summer Meeting, Chicago, IL

[84] R. G. Olsen, "Technical considerations for Wideband Power Line Communication – A Summary, Presented at the IEEE Schenectady, NY Section Meeting, May 31, 2002

[85] R. G. Olsen "Contact Current as a Possible Resolution to the ELF Magnetic Field Health Effects Issue," EPRI Environment Division Business Area Council Meeting, San Francisco, CA, April 2002

[86] R. G. Olsen, "Recent Developments in the ELF Electric and magnetic Field Health Effects Issue" WSU Seminar , March 26, 2002

[87] R. G. Olsen, Senior Design at Washington State University, Presented at the IEEE PES General meeting, Toronto, Canada, July 2003

[88] R. G. Olsen, "Introduction to Broadband over the Power Line," presentation at Puget Sound Energy, April 22, 2004

[89] R. G. Olsen, "A New Method to Measure High Voltage Transmission Line Conductor Sag," presentation at the University of Washington, May 13, 2004

[90] R. G. Olsen, "Globalization, Outsourcing of Engineering Jobs and the Response of Engineering Education," presentation at the University of Notre Dame, October 12, 2004

[91] R.G. Olsen, "Technical and Policy Considerations for Broadband over the Power Line, PSerc seminar, March 2005

[92] R. G. Olsen, "Evaluation of RF Measurement Instruments in strong ELF Fields," presentation to the Portland IEEE EMC Chapter, February 2005

[93] R. G. Olsen, "Evaluation of RF Measurement Instruments in strong ELF Fields," presentation to the Seattle IEEE EMC Chapter, February 2005

[94] R. G. Olsen "Technical Overview of Broadband Powerline (BPL) Communication Systems," 2005 IEEE EMC Symposium, Chicago, August 2005

[95] L. Zhou, J. B. Schneider, R. G. Olsen, "Using Artificial Loss to Control the Instability in the Huygens Subgridding Method," IEEE Antennas and Propagation Society International Symposium and Radio Science Meeting, Toronto, Canada, Jul. 2010

[96] R. G. Olsen, "Radiofrequency Burns in the Power System Workplace," EEI/EPRI Workshop on EMF/RF, Washington DC, November 4,5, 2010.

[97] Li, Z. and R. G. Olsen, "A Simple Up-over-and-down Model for Low Frequency Horizontal Electric Dipole Propagation Near An Interface," 2011 URSI meeting, Spokane, WA, July 2011

[98] Zhou, L, J. Schneider, R. Olsen, and R. Tell, "Examination of the Possibility of RF Burns Induced by Contact with a PEC" 2011 URSI meeting, Spokane, WA, July 2011

OTHER REPORTS

[1] R. G. Olsen, "Coupling Between Dipoles Immersed in a Semi-Infinite Conducting Medium," Westinghouse Research Report 71-1H2-PROSE-R1, December 1971.

[2] J. W. Allen, L. Ball, A. J. Farstad, E. L. Maxwell and R. G. Olsen, "Through-the-Earth Communications Research, 1971," Westinghouse Research Report 71-1H1-CALUP-R2, March 1972.

[3] R. G. Olsen, "Near-Field, Far-Field Extrapolation for Large-Aperture Nondirectional Antennas," Westinghouse Research Report 71-1H1-COMSY-R1, December 1972.

[4] D. H. Schrader, R. G. Olsen and G. L. Hower, "A Theoretical and Experimental Investigation of Microwave Irradiation of Plants and Seeds," Final Report to the NSF on Grant No. GK-40238, February 1976.

[5] F. H. Raab and R. G. Olsen, "The Application of Three-Axis Magnetic-Field Reception to LORAN-C," PNSI Corp. Final Report to the U.S. Coast Guard for Contract 74, 425-B/WDC, December 1977.

[6] R. G. Olsen and J. Daffe, "Study to Further Investigation Methods to Prevent Insulation Contamination by Particle Deposition Caused by Electric Fields on High Voltage D-C Station Post Insulators," Final Report to the Bonneville Power Administration on Contract 14-03-7003N, December 1977.

[7] R. G. Olsen, "Constraints on the Coupling of a 3-Axis Source and a 3-Axis Sensor in a Non-Free-Space Environment," Report to Polhemus Navigation Sciences, June 1978.

[8] R. G. Olsen, "Deviations of the Underground Magnetic Fields of Loop Antennas Located on the Earth's Surface from Free-Space Static Values," Report to Polhemus Navigational Sciences, September 1978.

[9] R. G. Olsen, "Sensitivity of the Coaxial Loop-Loop Array to Planar Inhomogeneities Parallel to the Array Axis," Report to Westinghouse Geophysical Instrumentation Systems, October 1978.

[10] R. G. Olsen and J. Daffe, "Studies on the Contamination and Flashover Initiation Process for HVDC Insulators," Final Report to the Bonneville Power Administration for Contract No. EW-78-C-80-0390, March 1979.

[11] R. G. Olsen and R. M. Nelson, "Techniques for Calculating and Plotting Electric Potential Distributions in Two and Three Dimensional Geometries," Final Report to the Bonneville Power Administration for Contract DE-AC79-79B 10553, January 1980.

[12] R. G. Olsen, "True and Pseudo Isolators," GTE Laboratories Technical Memo TM80-491.4, July 1980.

[13] J. W. Ketchum and R. G. Olsen, "Pulse Distortion Due to Bridged Taps on Telephone Lines," GTE Laboratories Technical Note TN80.474-4, November 1980.

[14] G. L. Hower and R. G. Olsen, "Boundary Element Equations and Reciprocity Relations Applied to Eddy Current NDE," Report #3 to the Electric Power Research Institute on Contract RP-1395-7, 1981.

[15] G. L. Hower, R. G. Olsen and L. D. Philipp, "Defect Characterization in Eddy Current Testing," Final Report to the Electric Power Research Institute on Contract RP-1395-7, August 1981.

[16] R. G. Olsen and R. M. Nelson, "Further Development of Two and Three Dimensional Techniques for Computing the Electric Potential and Field," Final Report to the Bonneville Power Administration for Contract DE-AC79-80BP21837, September 1981.

[17] R. G. Olsen, G. L. Hower, T. A. Pankaskie and M. Ando, "Coupling Between Transmission Lines and Thin Objects Parallel to the Line," Final Report to the Southern California Edison Company for Contract C 1370903k, January 1982.

[18] R. G. Olsen and G. L. Hower, "On the Validity of Quasi-Static Techniques for Calculating the Fields Near VLF Antenna Insulators," Final Report to the U.S. Naval Construction Battalion Center for Contract N6258/81 M R722, March 1982.

[19] R. G. Olsen and G. E. Roberts, "Boundary Element Techniques for Quasi-Electrostatic Problems Which Contain Thin Conductive Coatings on Dielectric Interfaces," Final Report to the Bonneville Power Administration on Contract DE-AC79-838P39831, June 1984.

[20] R. G. Olsen and G. L. Hower, "Proximity Effects in the Design of VLF Antenna Insulators," Final Report to the Naval Ocean Systems Center on Contract N66001-84-M-3142, January 1985.

[21] R. G. Olsen, "A Comparison Between Methods for Analyzing Semiconductor and Corona Problems," Report to ASEA Research and Innovation, April 1985.

[22] R. G. Olsen and T. Forsberg, "Theory and Experiment for Noise Fields from an HVDC Converter Station," ASEA Research and Innovation Research Report, May 1985.

[23] R. G. Olsen, "A Survey of the Literature on Methods for Solving the HVDC Corona Problem and Recommendations for Further Research," A report to the Bonneville Power Administration on Contract #DE-AI-85BP24408.

[24] M. Wu and R. G. Olsen, "A Comparison of the Exact and Several Approximate Formulas for Two Dimensional Sommerfeld Integrals," WSU Research Report, September 1987.

[25] T. A. Pankaskie and R. G. Olsen, "Literature Survey of Dielectric Materials Uniformly Loaded with Perfectly Conducting Oriented Needles," report to the Boeing Military Airplane Company on Contract No. B235002, 1987.

[26] H. L. Collins and R. G. Olsen, "HVDC Transmission Line Generated Behavior and Characteristics," A report to the Bonneville Power Administration on Contract No. DE-AI-85-BP24408, April 1988.

[27] R. G. Olsen, TLWORKSTATION CODE-Version 2.0 Volume 10- RNOISE MANUAL, Electric Power Research Institute Report EL-6420 CCM Vol. 5, July 1989.

[28] R. G. Olsen, "The Effect of Power Line Electric and Magnetic Fields on the Operation of Police Traffic Radar," A report to Jersey Central Power and Light Company of Contract No. 248383, November 1989.

[29] R. G. Olsen, "Electromagnetic Interference from Power Lines on Corridors with Multiple Circuits," A report to the Pacific Gas and Electric Company, on Contract No. Z12-5-674-89, December 1989.

[30] R. G. Olsen, S. D. Schennum and V. L. Chartier, "Comparison of Several Methods for Calculating Power Line Electromagnetic Interference Levels and Calibration with Long Term Data," A report to EPRI on RP-2025, January 1990.

[31] R. G. Olsen, "The Electromagnetic Fields of Electric Power Lines with Particular Reference to the Proposed Washington Water Power Glenrose Transmission Line Tap," A report to Washington Water Power, 11th March 1991.

[32] R. G. Olsen, "Characteristics of Electromagnetic Fields in the Vicinity of Electric Power Lines," A report to WL Energy System Technologies, April 1991.

[33] R. G. Olsen, D. C. James and V. L. Chartier, "The Performance of Reduced Magnetic Field Power Lines: Theory and Measurements on an Operating Line," A report to Puget Power, 15th June 1991.

[34] S. D. Schennum and R. G. Olsen, "Electromagnetic Interference From Power Lines on Corridors with Multiple Circuits," A report to the Electric Power Research Institute on RP-2025, July 1991.

[35] R. G. Olsen, "Survey of Electromagnetic Field Levels in the Vicinity of Paradise Ridge, Idaho," A report to Idaho Public Television, 10th April 1992.

[36] R. G. Olsen, "Regulating Power Line Electromagnetic Fields (EMF): A Brief Tutorial," A report to the Lakeridge Development Company, Renton, WA, 20th December 1991.

[37] R. G. Olsen, "Evaluation of the Magnetic Fields Near the Proposed Honey Creek Subdivision Adjacent to the Puget Power Talbot-Lakeside Transmission Line," A report to the Lakeridge Development Company, Renton, WA, 10th April 1992.

[38] R. H. Brewer, et al., "EMF Science and Engineering Workshop," US Department of Energy, October 1992.

[39] G. D. Casey, D. C. James, and R. G. Olsen, "Magnetic Field Assessment of the WWP Glenrose Top Transmission Line--Comparison of Predicted and Measured Magnetic Field Strength," A report to the City of Spokane, November 1992.

[40] R. G. Olsen, "The Magnetic Fields Near to and on the Armstrong Property Adjacent to the Wisconsin Electric Presque Isle to Plains 345 kV Transmission Line Near Marquette, MI," A report to Andrews Fosmire and Solka, Marquette, MI, October 1992.

[41] J. L. Young, J. B. Schneider and R. G. Olsen, "The Measured Equation of Invariance and Its Analytical Foundation," Submitted to *IEEE Antennas and Propagation Society Magazine*.

[42] J. L. Young, J. B. Schneider and R. G. Olsen, "The Measured Equation of Invariance and Its Analytical Foundation," WSU Technical Report

[43] Low Frequency Magnetic field Shielding - EPRI Report 1996

[44] Silva, J.M., Olsen, R.G., Young, F.S., "Power System Electromagnetic Compatibility" EPRI Resource Paper, Product No. 1001049, Palo Alto, CA, December, 2000.

[45] R. G. Olsen, "the Possible Use of the Electric Power Transmission/Distribution System as a Waveguide for a Wideband Communication System, EPRI Report , October 2001, EPRI Product ID #1001891

[46] "An Introduction to Electromagnetic Compatibility (EMC) Standards", Ramie, J., Silva, J.M., Olsen, R.G, EPRI Resource Paper, Product No. 1005494, Palo Alto, CA, July, 2002.

[47] R. G. Olsen and A. P. Sakis Meliopoulos, "Personnel Grounding and Safety Issues / Solutions Related to Servicing Telecommunications Equipment Connected to Fiber Optic Cables in Optical Ground Wire (OPGW)" PSerc Report, December 2002

[48] "Radio Frequency Exposure Fundamentals," Olsen, R.G, EPRI Resource Paper, Product No. 1005495, Palo Alto, CA, October, 2002.

[49] R. G. Olsen, M. Kuzyk and C. Yakymyshyn, "Novel and Low Cost Temperature Sensors for Lines, Transformers, and Cables, EPRI Product Number 1001820, December 2002.

[50] R. Olsen, "Wideband Power Line Communications: Overview and Status," EPRI Technical Update, Product Number 1008155, July 2003

[51] R. G. Olsen, R. A. Tell, K. Westby and K. Yamazaki, "Evaluation of Radio Frequency Measurement Instruments in Strong Extremely Low Frequency Fields and High Voltage Protective Hoods in Strong Radio Frequency Fields," EPRI Product Number 1008156, October 2003.

[52] R. Gorur, R. G. Olsen, A. Krose, F. Cook and S. Kumar, "Evaluation of Critical Components of Nonceramic Insulators (NCI) In-Service: Role of Defective Interfaces," PSerc Report on Project T-14, August, 2004

[53] P. Wong and R. G. Olsen, "Engineering the Multiple Use of the Right of Way" EPRI Technical Update, Product Number 1008743, December 2004

COURSES TAUGHT

EE 110 Introduction to Electrical Engineering

EE 214 Design of Logic and Analog Circuits
EE 261 Electrical Circuits I
EE 311 Electronics
EE 331 Electromagnetic Fields and Waves
EE 341 Communication Systems
EE 351 Distributed Parameter Systems
EE 352 E.E. Laboratory I
EE 361 Electrical Power Systems
EE 415 Design Project Management
EE 416 Electrical Engineering Design
EE 426 Electromagnetic Compatibility
EE 431 UHF and Microwave Circuits
EE 483 Wireless Communications
EE 504 Applied Optics
EE 516 Microwave and Optical Communications
EE 518 Advanced Electromagnetic Theory I
EE 519 Advanced Electromagnetic Theory II
EE 527 Antenna Theory

PAST MASTERS DEGREE STUDENTS

G. Geithman	(1974)	"An Approximate Solution to the Problem of a Lossy Dielectric Cylinder in a Rectangular Waveguide" (to Boeing)
B. Furumasu	(1976)	"Contamination Mechanisms for HVDC Insulators" (to Bonneville Power Administration)
G. Barta	(1976)	"River and Harbor Navigation System Using a Single Point Electromagnetic Source" (to Tektronix Labs)
J. Daffe	(1978)	"The Effect of Electric Field Modification and Wind On HVDC Insulation Contamination" (to Kaman Sciences)
T. Hall	(1978)	"A Near Real Time Scanned Acoustical Holography Reconstruction System Using the Ruticon Image Storage Device" (to Battelle NW Laboratories)
R. Nelson	(1981)	"Application of the Boundary Conditions on Total Charge in Solving Axially Symmetric, Electrostatic Problems by Means of Integral Equations" (to ATT Bell Laboratories)
T. Pankaskie	(1981)	"Electromagnetic Induction Between Power Lines and Buried Shared Right-of-Way Communications and Pipe Lines" (to Texas Instruments Antenna Laboratory)

A. Sharif	(1982)	"Scattered Electromagnetic Fields Due to Interaction Between an Infinite Horizontal Wire and an Adjacent Vertical Electric Dipole in the Presence of a Perfect Earth" (to home country)
B. Brim	(1983)	"Near Brewster Angle Scattering from Electrically Large Dielectric Cylinders" (to University of Colorado - Ph.D.)
M. Robert	(1984)	"Radio Noise Fields Generated by Corona Discharges on a Power Line" (to Texas Instruments)
D. Rouseff	(1984)	"Radio Noise Fields Generated by Corona Streamers on a Power Line Above Dissipative Earth" (to University of Washington - Ph.D.)
E. Roberts	(1984)	"Boundary Element Techniques for Quasi- Electrostatic Problems Which Contain Thin Conductive Coatings on Dielectric Interfaces" (to Naval Postgraduate School - Ph.D.)
J. Heaven	(1984)	"Microwave Amplifier Gain Bandwidth Enhancement" (to McDonnel Douglas)
B. Stimson	(1986)	"Predicting VHF/UHF Electromagnetic Noise from Corona on Power Line Conductors" (to Meteor Communications Corp.)
J. Reeves	(1986)	"A Simple Model for Weakly Coupled Lossy Transmission Lines of Finite Length Located Above a Grounded Dielectric Slab" (to Hewlett Packard)
H. Collins	(1988)	"HVDC Transmission Line Generated Corona Behavior and Characteristics" (to Boeing Advanced Systems)
P. Mannikko	(1988)	"Validation of the Hybrid Quasi-Static/Full-Wave Method for Capacitively Loaded Thin-Wire Antennas" (to Clemson University - Ph.D.)
R. Stearns	(1989)	"Electrical Environment of the Uprated NW/SW HVDC Intertie" (to Bonneville Power Administration)
B. Vanhoff	(1989)	"Homogenization Theory for Transversely Periodic Composite Materials" (to WSU-Ph.D.)
M. Hadwin	(1989)	"Active Voltage Probing Circuits" (to Tektronix)
A. Andrews	(1991)	"Chirped Pulse Propagation in Optical Fibers"

(to WSU Ph.D.)

D. James (1991) "An Evaluation of Reduced Magnetic Field Power Lines" (to Washington Water Power)

S. Backus (1993) "Software for Power Line Magnetic Field Calculations (to Engineering and Design Associates)

M. Willis (1994) "Grounding System Response to High Frequency Impulses (to Northern Technologies)

Chris Lyon (1994) "Modeling of Magnetic Fields Generated by Low Frequency Using Multipole Techniques Sources (to Silicon Systems)

Mike Zienhert (1995) "A Guide for Using Multipole Techniques to Model Magnetic Fields Generated by Low Frequency Sources" (to Vector Consulting)

Ken Edwards (2000) "Portable ADSS Surface Contamination Meter Calibrated in a High Voltage Environment," (to Bonneville Power Administration)

PAST PH.D. DEGREE STUDENTS

M.A. Usta (1979) "Excitation of Currents on Infinite Wires by Vertical and Horizontal Electric Dipoles in the Presence of Dissipative Earth" (to faculty position in home country)

A. Aburwein (1981) "Interaction of Long Horizontal Wires with Vertical Electric Dipoles in the Presence of a Conducting Half-Space" (to faculty position in home country)

Mingde Wu (1989) "Electromagnetic Interference from Transmission Lines" (to Adaptec, Inc.)

S. Schennum (1992) "Electromagnetic Interference from Power Lines" (to Gonzaga University)

T. Pankaskie (1994) "Scattering from Surfaces Coated with Anisotropic Dielectrics" (to Boeing)

G. Tanyer (1994) "Electromagnetic Scattering from Cylinders Coated with Non Concentric Dielectrics (to Ankara University in Turkey)

D. Monteith (1996) "Radiation Due to a Convex Curvature Discontinuity of a Dielectric Coated Perfect Conductor" (to Boeing)

P Moreno (1997) Low Frequency Magnetic Field Shielding (to Monterey University in Mexico)

Dave Phillips (1998) Optimal Design of High Voltage Electrodes
(to US Navy research lab, San Diego)

PRESENT GRADUATE STUDENTS

Name	MS/Ph.D.	Grad. Date	Research Topic
Zhi Li	Ph.D.	?	Power System EMC

FUNDED RESEARCH ACTIVITY

1973–1975 NSF Grant 40238 GK 40238 (with D. H. Schrader), "A Theoretical and Experimental Investigation of Microwave Irradiation of Plants and Seeds," funding $50,000

1975–1976 B.P.A. Contract No. 14-03-562IN, "Study to Investigate the Phenomena Associated with Particle Deposition Caused by Electric Fields on High-Voltage Post Insulators," funding $16,000

WSU Research and Arts Committee Grant, "Radio Navigation Aid for Inland and Coastal Waterways," funding $5,000

1976–1977 B.P.A. Contract No. 14-02-7003N, "Study to Further Investigate Methods to Prevent Insulator Contamination by Particle Deposition Caused by Electric Fields on High Voltage D.C. Station Post Insulators," funding $25,000

1978–1979 B.P.A. Contract DE-AC79-79B10553, "Development of Numerical Techniques and Computer Codes for Computing the Electric Potential and Field Near Two and Three Dimensional High Voltage Components," funding $29,000

NOAA Grant No. 04-78-B01-24, "Environmental Effects on Electrical Transmission Lines," funding $26,000

1980–1981 Southern California Edison Company Contract No. C1370903, "Coupling Between Transmission Lines and Long Thin Objects Parallel to the Line," funding $44,800

B.P.A. Contract No. DE-AC79-80BP21837, "Further Development of Two and Three Dimensional Numerical Techniques for Computing the Electric Potential and Field," funding $36,100

1981–1982 Electric Power Research Institute Contract No. RP 2025-1 (with D.H. Schrader), "Analysis of Radio Interference from Transmission Lines," funding $50,000

U.S. Navy Contract No. N 62583/81 M R727 (with G. L. Hower), "Computer Techniques for Antenna Insulators," funding $7,500

1982–1983 B.P.A. Contract No. DE-AC79-83BP39831, "Interactive Computer Techniques for Calculating Electric Fields," funding $32,000

1983–1988	Electric Power Research Institute, continuation of RP 2025-1, "Analysis of Radio Interference from Transmission Lines," funding $207,800
1984	U.S. Navy Contract No. N66001-84-M-3142 (with G. L. Hower), "Proximity Effects in the Design of VLF Insulators," funding $5,000
1985–1986	ASEA Research and Innovation Contract, "A Method for Solving Electrostatics Problems with Truncated Thin Layers," funding $11,000
1985–1987	B.P.A. Contract No. DE-AI-85BP24408 (with P. D. Pedrow), "Modeling Techniques for Electrical Fields and Ions," funding $138,000
1986	Boeing Aerospace Company Contract No. GR9341 (with G. L. Hower), "Bivariational Technique for Electromagnetic Scattering Problems," funding $20,000
1986–1988	Office of Naval Research Contract No. N00014-86-K-0612, "Quasi Static Hybrid Method," funding $100,000
1987–1989	Boeing Advanced Systems Company Contract No. B235002, "Scattering from Conductors Coated with Anisotropic Dielectrics," funding $95,100.
1988–1990	Power Authority of the State of New York Contract No. 029234-87, "Transmission Line VHF/UHF Radio Noise Study," funding $30,000.
1989–1990	Electric Power Research Institute, continuation of RP 2025-1, "Analysis of Radio Interference from Transmission Lines," funding $42,200.
1989	Pacific Gas and Electric Contract No. Z12-5-674-89, Electromagnetic Interference from Power Lines on Corridors with Multiple Circuits," funding $10,000.
1989–1992	Boeing Advanced Systems Co. Contract No. B245389 (with G. L. Hower), "Scattering from Conductors Coated with Anisotropic Dielectrics," funding $282,000.
1990–1993	Electric Power Research Institute, continuation of RP2025-1, "Analysis of Radio Interference from Transmission Lines," funding, $81,985.
1990–1991	Puget Power Contract, "An Evaluation of Reduced Magnetic Field Power Lines," funding $10,000.
1992–1993	Power Authority of the State of New York, Contract No. _____,"Transmission Line VHF/UHF Radio Noise Study," funding $10,000.
1992–1993	Bonneville Power Administration Contract No. DE-AP79-92BP65283, "Development and Validation of Software for Predicting ELF Magnetic Fields Near Power Lines," funding $25,000.
1993	Boeing Defense and Space Group Contract No. B245389 (with G. L. Hower and J. B. Schneider), "Scattering from Conductors Coated with Anisotropic Dielectrics," funding $75,000.

1993–1995	Electric Power Research Institute, No. RP3148-07, Task 3, "Magnetic Field Shielding Research" funding $127,800.
1995-1997	National Science Foundation, No. 96FG91428 - (with P. Pedrow) "Corona Streamer Onset as an Optimization Criterion for Design of High Voltage Hardware on Transmission Lines" funding $119,000
1996-1997	Electric Power Research Institute - Low Frequency Magnetic Shielding - funding $90,000
1996-1997	Naval Ocean Systems Center - VLF/LF Antenna Insulator Design - funding $50,000
1997-1999	Electric Power Research Institute - Research Program Management - funding $184,000
1999 – 2000	Avista Corp. A New Method to Measure Conductor Sag – funding $25,000
2000 – 2001	Electric Power Research Institute – "Possible Use of the Electric Power Transmission System as a Wideband Communication System" funding $83,000
2001 – 2002	NSF (PSERC) - Personnel Grounding and Safety Issues/Solutions Related to Servicing Telecommunictions Equipment Connected to Fiber Optic Cables in Optical Ground Wire - funding $16,000
2002 – 2004	NSF (PSERC) – Assistance to R. Gorur with "Computation of defect-induced electric fields on outdoor high voltage ceramic and non-ceramic insulators - funding $9,000
2002 – 2003	Electric Power Research Institute - Evaluation of RF Measurement Instruments in Strong ELF Fields and an evaluation of HV protective Suits in Strong RF fields – funding $114,000
2002 – 2003	BPA - Voltage Isolator Study – funding $51,000
2002 – 2005	Boeing - Support for High Voltage Radio Frequency Discharge Work – funding $112,000

EDUCATIONAL GRANTS

1982	GTE Laboratories Contract No. GTE820629, "Industrial Undergraduate Research Participation," funding $14,000
1991–1993	National Science Foundation, (with Y. Shamash and M. Osman), "Asian Pacific Cooperation with the University of Technology - Malaysia," funding $100,000.
2004 – 2009	National Science Foundation, "Northwest Engineering Talent Expansion Partnership" funding $850,000

2004 – 2008 National Science Foundation, "Computer Science, Engineering and Mathematics Scholarships," funding $400,000

EQUIPMENT GRANTS

1981–1982 Hewlett Packard Company - Microwave Network Analysis and Spectrum Analysis Equipment, $60,000

Pacific Northwest Bell - Digital Communications Equipment, $35,000

General Telephone Company of the Northwest - Microwave Digital Communications Equipment, $60,000

Western Electric Company - Optical Fiber, $3,000

1982–1983 Hewlett Packard Company - Microwave Equipment, $15,000

Tektronix Inc. - Optical Time Domain Reflectometer, $17,000

1986 Hewlett Packard Company - Microwave Network Analysis Equipment, $83,000

1989 Hewlett Packard Company - Microwave Signal Generator - $50,000.

1991 Hewlett Packard Company - Microwave Network Analyzer - $50,000.

PROFESSIONAL ACTIVITIES AND GOVERNMENT SERVICE (PRESENT)

Technical Paper Chair – 2006 IEEE EMC Symposium – Portland, OR

Technical Committee Co-Chair EMC Zurich 2005, 2007

Technical Editor – IEEE EMC Society Newsletter 2001 - 2006

USNC Representative to CIGRE Study Committee 36 (Electromagnetic Compatibility) 1998-2002

Associate Editor- IEEE Transactions on Electromagnetic Compatibility 1994- 2001

IEEE Power Engineering Society AC Fields
Working Group 1979 –
Chair 1988 – 1993

Technical Committee of the Washington State Electromagnetic Fields Task Force 1991

IEEE Power Engineering Society Corona Effects
Working Group 1983 –
Chair 1993 –

IEEE 1994 Antennas and Propagation Society Symposium, Seattle, WA. Planning Committee

Member, Commission B and E of the United States National Committee of the International Union of Radio Science

Member, National Academy of Sciences Committee to Review the U.S. Navy's Extremely-Low Frequency Submarine Communication Ecological Monitoring Program (ELF)

Member, Technical Committee, EMC Roma 96', EMC Roma 98'

Member Technical Committee, Tenth International Symposium on High Voltage Engineering, Montreal, 1997

Member CIGRE Working Group 36.04

Co- Technical Program Chair EMC Zurich, 2005

PROFESSIONAL ACTIVITIES AND GOVERNMENT SERVICE (PAST)

IEEE 1979 Antennas & Propagation Society Symposium, Seattle, WA, Technical Program Comm.
IEEE Power Engineering Society Insulator Contamination Working Group 1977-79
IEEE Power Engineering Society Magnetic Coupling Task Force 1979-83
Northwest Inductive Coordinating Council 1981-84
Academic Advisory Council of GTE Laboratories 1980-82; Vice-Chairman, 1981-82
Associate Editor-Radio Science, 1991 – 1994

REVIEWER FOR:

National Science Foundation
IEEE Electromagnetic Compatibility Society
IEEE Geoscience Electronics Society
IEEE Power Engineering Society
IEEE Antennas and Propagation Society
Radio Science
McGraw Hill Book Company
Prentice Hall

UNIVERSITY SERVICE

Graduate Studies Coordinator, Electrical Engineering Department	1980 –
Math-Engineering Liaison Committee	1974 – 1977
Reactor Safeguards Committee	1980 – 1984
Amateur Radio Club Advisor	1973 –
Research and Arts Committee (Grant-in-Aid Reviewer)	1980, 1982
Search Committee for Vice President-University Relations	1982
Search Committee for Dean, College of Engineering	1982
University Senate	1982 – 1984
University Telecommunications Study Committee	1980
Outstanding Instructor Selection Committee (University)	1983
Ad Hoc Committee on Professional Schools and the Liberal Arts	1983
Committee on Committees	1984
Research and Arts Committee	1984
University Senate Nominating Committee	1986 – 1987

Tau Beta Pi advisor	1987 – 1990
College of Engineering Research and Graduate Studies Council	1987 –
Dean Review Committee	1988 – 1989
Appeal Subcommittee of the Faculty Status Committee	1989
Office of Grant and Research Development Grant Evaluator	1989
Task Force on Graduate Education	1990
Evaluation for the Graduate Program in Physics	1991
Office of Grant and Research Development Grant Evaluator	1992
College of Engineering Tenure and Promotion Committee	1993-1995
School of EECS Executive Committee	1993-1994
Graduate Studies Committee - Vice Chair (1996-97)	1995-
Presidents Conflict of Interest Committee - Chair (1995-96)	1995-