

CURRICULUM VITA

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PERSONAL INFORMATION

Name: Edward Francis Kuester

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Business Address: Department of Electrical and Computer Engineering
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- Education:
- Attended Michigan State University, East Lansing, MI, 1967-1971; received B.S., Electrical Engineering, June 1971.
 - Attended University of Colorado, Boulder, 1971-1976; received M.S., Electrical Engineering, December 1974; Ph.D., Electrical Engineering, May 1976.
 - Ph.D. Thesis: “Radiation and Coupling Properties of Straight and Curved Optical Waveguides”, D.C. Chang, thesis advisor.
 - Scholarships, Fellowships and Visiting Positions:
 - * (Undergraduate) Brunswick Foundation Scholarship, 1967-1971
 - * (Graduate) NSF Traineeship, 1971-1972
 - * (Postgraduate) Summer Faculty Fellowship, Jet Propulsion Laboratory, Pasadena, California, June-August 1979.
 - * (Postgraduate) Visiting Scientist, Technische Hogeschool Delft, The Netherlands, August 1981-January 1982.
 - * (Sabbatical Leave) Visiting Professor (*Professeur Invité*), École Polytechnique Fédérale de Lausanne, Laboratoire d’Électromagnétisme et d’Acoustique, Switzerland, August 1992-June 1993.
 - * (Sabbatical Leave and Summer Position) Visiting scientist, National Institute of Standards and Technology (NIST), Boulder, CO, June-August 2002, June-August 2004 and January-December 2006.

- Foreign Languages:
- French and technical Russian read readily; also some reading knowledge of Latin.
 - Some spoken French.

PROFESSIONAL SOCIETIES

- Fellow, IEEE (AP-S, MTT, EMC)
- Member, URSI Commissions B and D
- Member, Society for Industrial and Applied Mathematics
- Member, Eta Kappa Nu
- Past Chairman, Denver-Boulder Chapter of IEEE Antennas and Propagation Society, 1979-1980

PREVIOUS EMPLOYMENT

1987-Present: Professor, University of Colorado, Boulder

1981-1987: Associate Professor, University of Colorado, Boulder, Department of Electrical Engineering. Duties include research, teaching undergraduate and graduate courses, and supervising graduate students in thesis work at the Master's and Ph.D. levels.

1979-1981: Assistant Professor, University of Colorado, Boulder, Department of Electrical Engineering.

1976-1978: Research Associate with Attendant Rank of Assistant Professor, University of Colorado, Boulder, Department of Electrical Engineering.

1972-1976: Research Assistant, University of Colorado, Boulder, Department of Electrical Engineering.

1974-1975: Teaching Associate, University of Colorado, Denver, Department of Electrical Engineering. Taught introductory course in electromagnetic fields.

Summer 1970: Engineering Assistant, General Telephone of Michigan, Muskegon. Assisted in engineering specifications for central office hookups for special customer installations.

RESEARCH INTERESTS

Theoretical investigations in all areas of electromagnetic wave theory, and in several areas of applied mathematics. Specific topics of interest include propagation along open guiding structures, antennas, remote sensing using electromagnetic waves, numerical modeling of planar microwave circuits and electromagnetic compatibility.

PROFESSIONAL ACTIVITIES

- Faculty Advisor, Rho Chapter of Eta Kappa Nu, 1979-1985.
- Served on Steering Committee organizing the National Radio Science Meetings at Boulder, 1978-1980.
- Session Chair, National Radio Science Meetings, 1979, 1985, 1986, 1995, 1999.
- Session Chair, International Microwave Symposium, May 1980, Washington, D.C.
- Reviewer for IEEE Transactions on AP, EMC, MTT, GRS; Optical Society of America; Radio Science; Journal of Electromagnetic Waves and Applications; Electronics Letters; Journal of Computational Physics.
- Associate Editor, IEEE Transactions on EMC, 1988-1990.
- Chair, Steering Committee, January 1995 and January 1996 URSI National Radio Science Meetings, Boulder, Colorado.
- Associate Editor, IEEE Transactions on Antennas and Propagation, 1998-2000.

LIST OF PUBLICATIONS

I. Books

- (1) *Electromagnetic Waves and Curved Structures* (with L. Lewin and D.C. Chang). London: Peter Peregrinus, 1977.
- (2) *The Boundary Layer Method in Diffraction Problems*, by V.M. Babič and N. Ya. Kirpičnikova (translated from the Russian). Berlin: Springer-Verlag, 1979.
- (3) “Imaging and propagation of beams in metallic or dielectric waveguides,” (with D.C. Chang), in *Hybrid Formulation of Wave Propagation and Scattering*, (L.B. Felsen, ed.). Dordrecht, The Netherlands: Martinus Nijhoff, 1984, pp. 185-194.
- (4) “Time-domain Weyl plane-wave representation for wave functions,” (with A.G. Tijhuis), in *Hybrid Formulation of Wave Propagation and Scattering* (L.B. Felsen, ed.). Dordrecht, The Netherlands: Martinus Nijhoff, 1984, pp. 285-292.
- (5) *Short-Wavelength Diffraction Theory*, by V.M. Babič and V.S. Buldyrev (translated from the Russian). Berlin: Springer-Verlag, 1991.
- (6) “Electromagnetic Wave Propagation,” (with D.C. Chang), in *Encyclopedia of Applied Physics*, vol. 5, VCH Publishers, 1993, pp. 379-404.
- (7) “Impedance Matching and Broadbanding” to appear in *Antenna Engineering Handbook*, 2007 (manuscript in press).
- (8) *Theory of Waveguides and Transmission Lines*, (with D.C. Chang), manuscript in preparation.

II. Co-holder of 2 U. S. patents:

- (1) (with C. L. Holloway) “Electromagnetic pyramidal cone absorber with improved low-frequency design,” U. S. patent no. 5,016,185 issued May 14, 1991.
- (2) (with H. Gibbons) “Pyramidal absorber having multiple backing layers providing improved low frequency response,” U. S. patent no. 5,331,567 issued July 19, 1994.

III. Journal Articles

- (1) “Propagation, attenuation and dispersion characteristics of inhomogeneous dielectric slab waveguides,” (with D.C. Chang), *IEEE Trans. MTT*, vol. 23, pp. 98-106 (1975).
- (2) “Nondegenerate surface-wave mode coupling between dielectric waveguides,” (with D.C. Chang), *IEEE Trans. MTT*, vol. 23, pp. 877-882 (1975).

- (3) "Single-mode pulse dispersion in optical waveguides," (with D.C. Chang), *IEEE Trans. MTT*, vol. 23, pp. 882-887 (1975).
- (4) "Surface-wave radiation loss from curved dielectric slabs and fibers," (with D.C. Chang), *IEEE J. Quant. Electron.*, vol. 11, pp. 903-907 (1975).
- (5) "Radiation and propagation of a surface-wave mode on a curved open waveguide of arbitrary cross-section," (with D.C. Chang), *Radio Science*, vol. 11, pp. 449-457 (1976).
- (6) "An alternative expression for the curvature loss of a dielectric waveguide and its application to the rectangular dielectric channel," *Radio Science*, vol. 12, pp. 573-578 (1977).
- (7) "Scattering of a surface wave from a curvature discontinuity on a convex impedance surface," (with D.C. Chang), *IEEE Trans. Antennas Prop.*, vol. 25, pp. 796-801 (1977).
- (8) "Propagating modes along a thin wire located above a grounded dielectric slab," (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 25, pp. 1065-1069 (1977).
- (9) "Modal theory of a long horizontal wire structure above the earth, 1, Excitation," (with D.C. Chang and R.G. Olsen), *Radio Science*, vol. 13, pp. 605-613 (1978).
- (10) "Modal theory of long horizontal wire structures above the earth, 2, Properties of discrete modes," (with R.G. Olsen and D.C. Chang), *Radio Science*, vol. 13, pp. 615-623 (1978).
- (11) "An appraisal of methods for computation of the dispersion characteristics of open microstrip," (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 27, pp. 691-694 (1979).
- (12) "Low-frequency behavior of the propagation constant along a thin wire in an arbitrarily shaped mine tunnel," (with D.B. Seidel), *IEEE Trans. Micr. Theory Tech.*, vol. 27, pp. 736-741 (1979).
- (13) "An analytic theory for narrow open microstrip," (with D.C. Chang), *Arch. Elek. Übertragungstech.*, vol. 33, pp. 199-206 (1979).
- (14) "Fundamental mode propagation on dielectric fibres of arbitrary cross-section," (with R.C. Pate), *IEE Proc.*, vol. 127, part H, pp. 41-51 (1980).
- (15) "Closed-form expressions for the current or charge distribution on parallel strips or microstrip," (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 28, pp. 254-259 (1980).
- (16) "Theory of dispersion in microstrip of arbitrary width," (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 28, pp. 259-265 (1980).
- (17) "Addendum to 'Closed-form expressions for the current or charge distribution on parallel strips or microstrip,' " (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 28, p. 1143 (1980).

- (18) "Total and partial reflection from the end of a parallel-plate waveguide with an extended dielectric slab," (with D.C. Chang), *Radio Science*, vol. 16, pp. 1-13 (1981).
- (19) "A hybrid method for paraxial beam propagation in multimode optical waveguides," (with D.C. Chang), *IEEE Trans. Micr. Theory Tech.*, vol. 29, pp. 923-933 (1981).
- (20) "Electromagnetic wave propagation along horizontal wire systems in or near a layered earth," (with D.C. Chang and S.W. Plate), *Electromagnetics*, vol. 1, pp. 243-265 (1981).
- (21) "Radiation loss from a dielectric channel waveguide bend," *Proceedings of the SPIE - The International Society for Optical Engineering*, vol. 317, pp. 101-106 (1981).
- (22) "The thin-substrate approximation for reflection from the end of a slab-loaded parallel-plate waveguide with application to microstrip patch antennas," (with R.T. Johnk and D.C. Chang), *IEEE Trans. Ant. Prop.*, vol. 30, pp. 910-917 (1982).
- (23) "Coupling and imaging of Gaussian beams in parallel dielectric slab waveguides," (with G.S. Dow and D.C. Chang), *Arch. Elek. Übertragungstech.*, vol. 36, pp. 427-435 (1982).
- (24) "A geometrical theory for the resonant frequencies and Q-factors of some triangular microstrip patch antennas," (with D.C. Chang), *IEEE Trans. Ant. Prop.*, vol. 31, pp. 27-34 (1983).
- (25) "Propagation constants for linearly polarized modes of arbitrarily shaped optical fibers or dielectric waveguides," *Optics Letters*, vol. 8, pp. 192-194 (1983).
- (26) "Accurate approximations for a function appearing in the analysis of microstrip," *IEEE Trans. Micr. Theory Tech.*, vol. 32, pp. 131-133 (1984).
- (27) "Generalisation of the partial-power law (Brown's identity) to waveguides with lossy media," *Electronics Letters*, vol. 20, pp. 456-457 (1984).
- (28) "The effective cross-section method for dielectric waveguides in or on a substrate," *Radio Science*, vol. 19, pp. 1239-1244 (1984).
- (29) "The transient electromagnetic field of a pulsed line source located above a dispersively reflecting surface," *IEEE Trans. Ant. Prop.*, vol. 32, pp. 1154-1162 (1984).
- (30) "A fast-field program for sound propagation in a layered atmosphere above an impedance ground", (with R. Raspet, S.W. Lee, D.C. Chang, W.F. Richards, R. Gilbert and N. Bong), *J. Acoust. Soc. Amer.*, vol. 77, pp. 345-352 (1985).
- (31) "Geometrical theory of a one-dimensional microstrip resonator: The effect of topside charges and currents," (with D.C. Chang and A.R. Mahnad), *Radio Science*, vol. 20, pp. 819-826 (1985).

- (32) "Virial theorems for electromagnetic fields," *Internat. J. Electron.*, vol. 61, pp. 583-596 (1986).
- (33) "Comments on 'Correction of Maxwell's equations for signals I', 'Correction of Maxwell's equations for signals II', and 'Propagation velocity of electromagnetic signals'," *IEEE Trans. Electromag. Compat.*, vol. 29, pp. 187-190 (1987).
- (34) "Explicit approximations for the static capacitance of a microstrip patch of arbitrary shape," *J. Electromag. Waves Appl.*, vol. 2, pp. 103-135 (1987).
- (35) "Accurate analysis of arbitrarily shaped patch resonators on thin substrates," (with T.M. Martinson), *IEEE Trans. Micr. Theory Tech.*, vol. 36, pp. 324-331 (1988).
- (36) "A hybrid method for solving time domain integral equations in transient scattering problems," (with A.G. Tijhuis and R. Wiemans), *J. Electromag. Waves Appl.*, vol. 3, pp. 485-511 (1989).
- (37) "The edge admittance of a wide microstrip patch as seen by an obliquely incident wave," (with T.M. Martinson and D.C. Chang), *IEEE Trans. Ant. Prop.*, vol. 37, pp. 413-417 (1989).
- (38) "Numerical computation of the incomplete Lipschitz-Hankel integral $Je_0(a, z)$," (with S.L. Dvorak), *J. Comp. Phys.*, vol. 87, pp. 301-327 (1990).
- (39) "A generalized edge boundary condition for open microstrip structures," (with T.M. Martinson), *J. Electromag. Waves Appl.*, vol. 4, pp. 273-295 (1990).
- (40) "Strip edge shape effects on conductor loss calculations using the Lewin/Vainshtein method," (with E.L. Barsotti and J.M. Dunn), *Electron. Lett.*, vol. 26, pp. 983-985 (1990).
- (41) "Effect of metallization edge shape on conductor loss of open coplanar waveguide," (with E.L. Barsotti and J.M. Dunn), *Micr. Opt. Technol. Lett.*, vol. 3, pp. 389-391 (1990).
- (42) "Comparisons of approximations for effective parameters of artificial dielectrics," (with C.L. Holloway), *IEEE Trans. Micr. Theory Tech.*, vol. 38, pp. 1752-1755 (1990).
- (43) "Homogenization analysis of electromagnetic strip gratings," (with R. R. DeLyser), *J. Electromagnetic Waves Applications*, vol. 5, pp. 1217-1236 (1991).
- (44) "A new method for computing the reaction between two rooftop basis functions in a planar structure," (with S. L. Dvorak), *International J. Microwave Millimeter-Wave Computer-Aided Engineering*, vol. 1, pp. 333-345 (1991).
- (45) "A simple method to account for the edge shape in the conductor loss in microstrip," (with E. L. Barsotti and J. M. Dunn) *IEEE Trans. Microwave Theory Techniques*, vol. 39, pp. 98-106 (1991).

- (46) “Numerical computation of 2D Sommerfeld integrals - Decomposition of the angular integral,” (with S.L. Dvorak) *J. Comp. Phys.*, vol. 98, pp. 189-216 (1992).
- (47) “Numerical computation of 2D Sommerfeld integrals - A novel asymptotic extraction technique,” (with S.L. Dvorak) *J. Comp. Phys.*, vol. 98, pp. 217-230 (1992).
- (48) “Design of log periodic strip grating microstrip antenna,” (with R.R. DeLyser and D.C. Chang), *Int. J. Micr. Millimeter-Wave Computer-Aided Eng.*, vol. 3, pp. 143-150 (1993).
- (49) “Edge shape effects and quasi-closed form expressions for the conductor loss of microstrip lines,” (with C. L. Holloway) *Radio Science*, vol. 29, pp. 539-559 (1994).
- (50) “Guided waves along a metal grating on the surface of a grounded dielectric slab,” (with F. Bellamine) *IEEE Trans. Microwave Theory and Techniques*, vol. 42, pp. 1190-1197 (1994).
- (51) “A low-frequency model for wedge or pyramid absorber arrays—I: Theory,” (with C. L. Holloway) *IEEE Trans. Electromagnetic Compatibility*, vol. 36, pp. 300-306 (1994).
- (52) “A low-frequency model for wedge or pyramid absorber arrays—II: Computed and measured results,” (with C. L. Holloway) *IEEE Trans. Electromagnetic Compatibility*, vol. 36, pp. 307-313 (1994).
- (53) “Computable error bounds for variational functionals of solutions of a convolution integral equations of the first kind,” *Wave Motion*, vol. 22, pp. 171-185 (1995).
- (54) “Closed-form expressions for the current density on the ground plane of a microstrip line, with application to ground plane loss,” (with C. L. Holloway) *IEEE Trans. Microwave Theory and Techniques*, vol. 43, pp. 1204-1207 (1995).
- (55) “A quasi-closed form expression for the conductor loss of CPW lines, with an investigation of edge shape effects,” (with C. L. Holloway) *IEEE Trans. Microwave Theory and Techniques*, vol. 43, pp. 2695-2701 (1995).
- (56) “Modeling semi-anechoic electromagnetic measurement chambers,” (with C. L. Holloway) *IEEE Trans. Electromagnetic Compatibility*, vol. 38, pp. 79-84 (1996).
- (57) “Net and partial inductance of a microstrip ground plane,” *IEEE Trans. Electromagnetic Compatibility*, vol. 40, pp. 33-46 (1998).
- (58) “Equivalent boundary conditions for a perfectly conducting periodic surface with a cover layer,” (with C. L. Holloway) *Radio Science*, vol. 35, pp. 661-681 (2000).
- (59) “Impedance-type boundary conditions for a periodic interface between a dielectric and a highly conducting medium,” (with C. L.

- Holloway) *IEEE Trans. Antennas and Propagation*, vol. 48, pp. 1660-1672 (2000).
- (60) “Power loss associated with conducting and superconducting rough interfaces,” (with C. L. Holloway) *IEEE Trans. Microwave Theory and Techniques*, vol. 48, pp. 1601-1610 (2000).
- (61) “An investigation into the geometric optics approximation for indoor scenarios with a discussion on pseudolateral waves,” (with M. G. Cotton and C. L. Holloway) *Radio Science*, vol. 37, pp. 1-1 to 1-20 (2002).
- (62) “A double negative (DNG) composite medium composed of magnetodielectric spherical particles embedded in a matrix,” (with C. L. Holloway, J. Baker-Jarvis and P. Kabos) *IEEE Trans. Ant. Prop.*, vol. 51, pp. 2596-2603 (2003).
- (63) “Averaged transition conditions for electromagnetic fields at a meta-film,” (with M. A. Mohamed, M. Picket-May and C. L. Holloway) *IEEE Trans. Ant. Prop.*, vol. 51, pp. 2641-2651 (2003).
- (64) “Effective electromagnetic properties of honeycomb composites, and hollow-pyramidal and alternating-wedge absorbers,” (with M. Johansson and C. L. Holloway) *IEEE Trans. Ant. Prop.*, vol. 53, pp. 728-736 (2005).
- (65) “An orthogonality-based de-embedding technique for microstrip networks,” (with M. P. Spowart) *IEEE Trans. Micr. Theory Tech.*, vol. 53, pp. 938-946 (2005).
- (66) “Guaranteed passive direct lumped-element modeling of transmission lines,” (with Se-Ho You) *IEEE Trans. Micr. Theory Tech.*, vol. 53, pp. 2826-2834 (2005).
- (67) “Reflection and transmission properties of a metafilm: With an application to a controllable surface composed of resonant particles,” (with C. L. Holloway, M. A. Mohamed and A. Dienstfrey) *IEEE Trans. Electromag. Compat.*, vol. 47, pp. 853-865 (2005).
- (68) “Fast and direct coupled-microstrip interconnect reduced-order modeling based on the finite-element method,” (with Se-Ho You) *IEEE Transactions on Microwave Theory and Techniques*, vol. 54, pp. 2232-2242 (2006).
- (69) “Corrections to ‘Closed-form expressions for the current density on the ground plane of a microstrip line, with application to ground plane loss,’ ” (with C. L. Holloway) *IEEE Trans. Microwave Theory and Techniques*, vol. 54, pp. 4018-4019 (2006).
- (70) “A novel asymptotic extraction technique for the efficient evaluation of a class of double Sommerfeld integrals,” (with M. P. Spowart) *Journal of Computational and Applied Mathematics*, vol. 197, pp. 597-611 (2006).

IV. Selected Technical Reports and Meeting Presentations

- (1) “Frequency-dependent definitions of microstrip characteristic impedance,” (with D.C. Chang and L. Lewin), *International URSI Symposium Digest*, 26-29 August 1980, Munich, W. Germany, pp. 335B/1-3.
- (2) “Imaging and coupling in parallel multimode dielectric slab waveguides,” (with S. Dow and D.C. Chang), *Society of Photo-optical Instrumentation Engineers Convention*, July 1980, San Diego, California, *Proceedings SPIE*, vol. 239, pp. 80-83.
- (3) “Radiation loss from a curved dielectric channel waveguide in a dense substrate,” (with R.L. Holland and D.C. Chang), *Scientific Rept. No. 64*, Dept. of Electrical Engineering, University of Colorado, Boulder, June 1981. See also *National Radio Science Meeting (URSI) Digest*, 12-16 January 1981, Boulder, Colorado, p. 157.
- (4) “Current on the top side of wide microstrip and its contribution to the effective dielectric constant,” (with D.C. Chang), *National Radio Science Meeting (URSI) Digest*, 12-16 January 1981, Boulder, Colorado, p. 124.
- (5) “Propagation constants for step-index optical fibers of arbitrary cross-section at high frequency,” (with R. Ebrahimian), *National Radio Science Meeting (URSI) Digest*, 16-19 June 1981, Los Angeles, California, p. 33.
- (6) “Resonance and Q properties of isosceles triangular patch antennas of 60° and 90° vertex,” (with D.C. Chang), *National Radio Science Meeting (URSI) Digest*, 16-19 June 1981, Los Angeles, California, p. 105.
- (7) “A Weyl representation for two-dimensional time-domain wave functions and its applications to scattering from inhomogeneous dielectric slabs,” (with A.G. Tijhuis), *Report No. 1982-17*, Laboratory of Electromagnetic Research, Dept. of Electrical Engineering, Technische Hogeschool, Delft, The Netherlands, December 1982. See also *International URSI Symposium Digest*, 23-26 August 1983, Santiago de Compostela, Spain, pp. 207-210.
- (8) “Radiation from a bent, narrow microstrip above a grounded dielectric slab,” *National Radio Science Meeting (URSI) Digest*, 24-28 May 1982, Albuquerque, New Mexico, p. 19.
- (9) “On the ray description of the modes of a triangular-core optical fiber,” (with R. Ebrahimian and D.C. Chang), *National Radio Science Meeting (URSI) Digest*, 5-7 January 1983, Boulder, Colorado, p. 48.
- (10) “The far-field radiation characteristics of a resonant conducting ring on a grounded dielectric substrate,” (with R.L. Holland and D.C.

- Chang), *National Radio Science Meeting (URSI) Digest*, 5-7 January 1983, Boulder, Colorado, p. 200.
- (11) "A double-variational method for computing the end effects of antennas and transmission lines," (with D.C. Chang), *National Radio Science Meeting (URSI) Digest*, 23-26 May 1983, Houston, Texas, p. 140.
 - (12) "Effective cross-sections for dielectric waveguides in substrate environments," *IEEE International Microwave Symposium Digest*, 31 May - 3 June 1983, Boston, Massachusetts, pp. 117-118.
 - (13) "Image formation in circular waveguides and optical fibers," (with A.R. Mahnad), *IEEE International Microwave Symposium Digest*, 31 May - 3 June 1983, Boston, Massachusetts, pp. 122-124.
 - (14) "Electromagnetic virial theorems," *National Radio Science Meeting (URSI) Digest*, 11-13 January 1984, Boulder, Colorado, p. 8.
 - (15) "Quasistatic line parameters for slotlines," (with D.C. Chang), *National Radio Science Meeting (URSI) Digest*, 11-13 January 1984, Boulder, Colorado, p. 15.
 - (16) "A unified approach to the derivation of bivariational principles in acoustics and electromagnetics," (with D.C. Chang), *Scientific Report No. 80*, Dept. of Electrical and Computer Engineering, University of Colorado, Boulder, July 1985; see also *1985 North American Radio Science Meeting (URSI) Digest*, 17-21 June 1985, Vancouver, Canada, p. 212.
 - (17) "A note on the edge admittance of a wide microstrip patch with electrically thin substrate," (with D.C. Chang and T.M. Martinson), *Scientific Report No. 81*, Dept. of Electrical and Computer Engineering, University of Colorado, Boulder, July 1985; see also *1985 North American Radio Science Meeting (URSI) Digest*, 17-21 June 1985, Vancouver, Canada, p. 92.
 - (18) "Plane-wave reflection from inhomogeneous uniaxially anisotropic absorbing dielectric layers," (with C.L. Holloway), *Sci. Rept. No. 97*, Electromagnetics Laboratory, Dept. Elec. Comp. Eng., Univ. of Colorado, Boulder, May 1989; see also *1989 National Symposium on Electromagnetic Compatibility Digest*, 23-25 May 1989, Denver, Colorado, pp. 394-399.
 - (19) "Modeling semi-anechoic electromagnetic measurement chambers," (with C.L. Holloway), *Sci. Rept. No. 99*, Electromagnetics Laboratory, Dept. Elec. Comp. Eng., Univ. of Colorado, Boulder, August 1990.
 - (20) "Measurement techniques for determining the reflection coefficient and complex permittivity for pyramid cone absorbers," (with C.L. Holloway), *Sci. Rept. No. 101*, Electromagnetics Laboratory, Dept. Elec. Comp. Eng., Univ. of Colorado, Boulder, August 1990.

- (21) "Homogenization analysis of electromagnetic strip gratings," (with R.R. Delyser), *Sci. Rept.. No. 104*, Electromagnetics Laboratory, Dept. Elec. Comp. Eng., Univ. of Colorado, Boulder, May 1990.
- (22) "Guided waves along a metal grating on the surface of a grounded dielectric slab," (with F. Bellamine), *Sci. Rept. No. 107*, Electromagnetics Laboratory, Dept. Elec. Comp. Eng., Univ. of Colorado, Boulder, August 1990.
- (23) "Development of a frequency-dependent TLM," (with F. Bellamine) *1991 North American Radio Science Meeting Digest*, London, Ontario, 24-28 June, 1991, p. 78.
- (24) "Comparison of conductor loss for rough and smooth surfaces," (with C.L. Holloway) *1991 North American Radio Science Meeting Digest*, London, Ontario, 24-28 June, 1991, p. 227.
- (25) "Perturbation calculations for parasitically coupled S-parameters," (with J. C. Moore) *1991 North American Radio Science Meeting Digest*, London, Ontario, 24-28 June, 1991, p. 292.
- (26) "De-embedding S-parameters from numerically determined current distributions of planar junctions," (with J. C. Moore, J.-X. Zheng, D. C. Chang) *1991 North American Radio Science Meeting Digest*, London, Ontario, 24-28 June, 1991, p. 293.
- (27) "Analysis of strip grating antennas," (with R. R. DeLyser and S. Kogut) *1991 North American Radio Science Meeting Digest*, London, Ontario, 24-28 June, 1991, p. 313.
- (28) "Analysis of semi-anechoic chambers using the frequency-dependent TLM technique," (with F.H. Bellamine) *1992 National Radio Science Meeting Digest*, Boulder, Colorado, 7-10 January, 1992, p. 111.
- (29) "Numerical modeling of passive circuits in coplanar waveguide and coplanar stripline," (with S. Petrakos, D. Jahn, and D. C. Chang) *1992 National Radio Science Meeting Digest*, Boulder, Colorado, 7-10 January, 1992, p. 231.
- (30) "Homogenization analysis of strip grating antennas," (with R.R. DeLyser) *1992 National Radio Science Meeting Digest*, Boulder, Colorado, 7-10 January, 1992, p. 233.
- (31) "A proper surface impedance for determining losses in planar junctions," (with C.L. Holloway and J.C. Moore) *URSI Radio Science Meeting Digest*, Chicago, Illinois, July 20-24, 1992, p. 120.
- (32) "A broadband, compact, logarithmically periodic strip grating antenna," (with R. DeLyser and D.C. Chang) *URSI Radio Science Meeting Digest*, Chicago, Illinois, July 20-24, 1992, p. 473.
- (33) "Broadband quasi-microstrip anisotropic antennas," (with Z.B. Popović and R. DeLyser), *1992 IEEE Antennas and Propagation Society International Symposium Digest*, Chicago, Illinois, July 20-24, 1992, p. 2073.

- (34) “Computable error bounds for variational solutions of integral equations of the first kind arising in electromagnetics,” *Tech. Rept.*, LEMA-DE, École Polytechnique Fédérale de Lausanne, Ecublens CH-1015 Lausanne, Switzerland, July 1994.
- (35) “Novel modeling of microstrip gratings and design of meander-line filters,” (with T. Wu) *Proceedings of Advanced Technology Workshop on Wireless Communications*, Boulder, CO, August 19-21, 1996, pp. 41-45.
- (36) “Effective boundary conditions for rough surfaces with a thin cover layer,” (with Holloway, C. L.) *IEEE Antennas and Propagation Society 1999 International Symposium*, 11-16 July 1999, Orlando, FL, pp. 506-509.
- (37) “A model for predicting the reflection coefficient for hollow pyramidal absorbers,” (with Holloway, C.L.; Johansson, M.; Johnk, R.T.; Novotny, D.R.) *1999 IEEE International Symposium on Electromagnetic Compatibility*, 2-6 August 1999, Seattle, WA, pp. 861-866.
- (38) “A frequency- and time-domain investigation into the geometric optics approximation for wireless indoor applications,” (with M. G. Cotton and C. L. Holloway) US Department of Commerce, *NTIA Report 00-379*, June 2000.
- (39) “Modeling linear and nonlinear inductive effects in superconducting planar circuits,” (with Booth, J.C. and Holloway, C.L.) *2001 IEEE International Symposium on Electromagnetic Compatibility*, 13-17 August 2001, Montreal, Canada, pp. 594-599.
- (40) “Thick FSSs for large scan angle applications,” (with H. Loui, F. Lalezari and Z. Popović) *2004 IEEE Antennas and Propagation Society Symposium*, vol. 2, pp 2171-2174.
- (41) “Fast and efficient interconnect modelling using finite element method and model order reduction,” (with Se-Ho You) *2004 IEEE MTT-S International Microwave Symposium Digest*, vol. 3, pp 1377-1380.
- (42) “Broadband complex permittivity measurements of dielectric substrates using a split-cylinder resonator,” (with M. D. Janezic and J. Baker-Jarvis) *2004 IEEE MTT-S International Microwave Symposium Digest*, vol. 3, p 1817-1820.
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