

## VITAE OF ALLEN TAFLOVE

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Education: B.S.E.E. (1971), M.S.E.E. (1972), Ph.D. (1975): all from Northwestern University, Evanston, IL

### Positions

1975 – 84 IIT Research Institute, Chicago, IL: Associate Engineer, Research Engineer, Senior Engineer  
1984 – 88 Northwestern University, Evanston, IL: Associate Professor (tenured 1986)  
1988 – Northwestern University, Evanston, IL: Full Professor  
2000 – 03 Charles Deering McCormick Professor of Teaching Excellence, Northwestern University  
2000 – 05 Master, Lindgren/Slivka Residential College of Science and Engineering, Northwestern University  
2009 – 12 Bette and Neison Harris Chair in Teaching Excellence, McCormick School of Engineering

### Professional Society Memberships

Fellow, Institute of Electrical and Electronics Engineers (IEEE); Member: Electromagnetics Academy; International Union of Radio Science Commissions B, D, and K; Optical Society of America; Eta Kappa Nu; Tau Beta Pi; Sigma Xi; American Association for the Advancement of Science.

### Consultancies

AT&T Wireless; British Columbia Hydroelectric Authority; City of Highland Park, IL; City of Park Ridge, IL; City of Wheaton, IL; Commonwealth Edison; Corridor Compatibility Co.; Cray Research; Electric Power Research Institute; Intec Group, Inc.; Lawrence-Livermore National Laboratory; Lockheed; MIT Lincoln Laboratory; MRJ, Inc.; Naval Research Laboratory; Princeton Lightwave, Inc.; T&M Antennas, Inc.; T-Mobile, Inc.; Velocitel, Inc., Village of Glen Ellyn, IL; Village of Wilmette, IL; Village of Winnetka, IL; VoiceStream Wireless.

### Biosketch

Since 1972, Allen has pioneered finite-difference time-domain (FDTD) computational electrodynamics. He coined the FDTD acronym in 1980, and in 1990 was the first person to be named an IEEE Fellow in this area. FDTD techniques have emerged as a primary means to solve scientific and engineering problems dealing with electromagnetic wave interactions with material structures. Current FDTD modeling applications range from near-DC (geophysical phenomena) through microwaves (radar/wireless technologies, analog/digital circuits, biomedical imaging/treatment) to visible light (photonics/biophotonics, nanotechnology). More than 36 commercial and university-developed FDTD software suites are available for use; an estimated 2,000 FDTD-related publications appear each year.

Allen has authored, co-authored, or edited four books on FDTD theory, algorithms, and applications. As of Dec. 31, 2009, these books had total sales of approximately 9,800 volumes. Overall, Allen has authored or co-authored five books, 21 articles or chapters in books and magazines, 128 refereed journal papers, and 14 U.S. patents. In 2002, he was named by the Institute of Scientific Information to its original listing of the most-cited researchers worldwide, as published in *ISI Highly Cited.com*. As of Dec. 31, 2009, according to the ISI Web of Science®, his books and journal papers had received a total of approximately 10,750 citations.

Allen has been the adviser or co-adviser of 22 Ph.D. recipients and three postdocs. Seven of these advisees (two men, five women) hold tenured or tenure-track positions in university electrical engineering departments, including the University of Colorado-Boulder, the University of Wisconsin-Madison, McGill University, Northwestern University, the University of New Mexico-Albuquerque, and National Taiwan University. Many of his other advisees have held professional positions at major research institutions and companies including MIT Lincoln Lab, Jet Propulsion Lab, Argonne National Lab, U.S. Air Force Research Lab, Northrop-Grumman, Raytheon, and Ball Aerospace.

Allen has served as the faculty adviser to Northwestern's Undergraduate Research Journal, McCormick's Undergraduate Design Competition, McCormick's Honors Program in Undergraduate Research, and McCormick's student chapters of the Eta Kappa Nu and Tau Beta Pi honor societies. He is the first McCormick faculty member ever to be named both Teacher of the Year and Adviser of the Year for a single academic year (2005-06). His other recognitions in this regard include appointment as a Charles Deering McCormick Professor of Teaching Excellence (2000-03), appointment as the Bette and Neison Harris Chair in Teaching Excellence (2009-12), receiving the 2008 Northwestern Alumni Association Excellence in Teaching Award, and being selected to the Northwestern University Associated Student Government honor roll of best teachers for 2002, '03, '04, '05, '07, '08, and '09.

Allen's research interests have spanned much of the electromagnetic spectrum. Since 1975, he and his students and collaborators have modeled electrodynamic phenomena ranging from potential precursors of earthquakes (indicated by the generation of anomalous ultralow-frequency radio waves) to potential precursors of cancers of the colon, pancreas, and lung (indicated by anomalous backscattering of light from seemingly normal tissues). A guiding principle of his research is that "Maxwell's equations work from dc to light" and for the benefit of human society.

## Biographical Listings

*Who's Who in America; Who's Who in Science and Engineering; Who's Who in Engineering; Who's Who in American Education; Who's Who in Engineering Education, and Who's Who in Electromagnetics*

## Distinctions

1971	BSEE With Highest Distinction, Northwestern University
1975	Dissertation-Year Cabell Fellow (Outstanding Ph.D. recipient, Northwestern University Technological Institute)
1990	IEEE Fellow (sponsored by IEEE Antennas and Propagation Society)
1990–91	Distinguished National Lecturer, IEEE Antennas and Propagation Society
1990	Member, Electromagnetics Academy, Cambridge, MA
1991	Adviser of the Year, Northwestern University McCormick School of Engineering
2000–03	Charles D. McCormick Professor of Teaching Excellence, Northwestern University
2002	Named to the original Highly Cited Researchers list of the Institute for Scientific Information
2006	Adviser of the Year and Teacher of the Year, McCormick School of Engineering
2008	Excellence in Teaching Award, Northwestern University Alumni Association
2009-12	Bette and Neison Harris Chair in Teaching Excellence, McCormick School of Engineering

## **PH.D. AND POSTDOCTORAL ALUMNI**

To date, Prof. Taflove has been the advisor or co-advisor of 22 Ph.D. recipients and three postdocs at Northwestern University:

- Jeffrey Blaschak (Ph.D., June 1988). Systems engineer, Defensive Systems Division, Northrop-Grumman Corp., Rolling Meadows, IL.
- Fady Harfoush (Ph.D., June 1989). Manager, Quantitative analytics, Thomson-Reuters, Chicago, IL.
- Thomas Moore (Ph.D., June 1989). Director, Advanced Concepts and Technologies Division, Northrop-Grumman Corp., Linthicum, MD.
- Mark Strickel (Ph.D., June 1989). Portfolio manager, Talon Asset Co., Chicago, IL.
- Thomas Jurgens (Ph.D., June 1991). Systems engineer, Defensive Systems Division, Northrop-Grumman Corp., Rolling Meadows, IL.
- Melinda Picket-May (Ph.D., Aug. 1993). Tenured associate professor, Dept. of Electrical and Computer Engineering, University of Colorado, Boulder, CO.
- Rose Joseph (Ph.D., June 1994). Staff scientist, MIT Lincoln Laboratory, Lexington, MA (on leave).
- Christopher Reuter (Ph.D., June 1994). Staff engineer, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH.
- Daniel Katz (Ph.D., June 1994). Senior computational researcher and High-Performance Computing/Grid consultant in the Computation Institute, University of Chicago, and NSF TeraGrid GIG Director of Science.
- Eric Thiele (Ph.D., June 1994). Staff engineer, Ball Aerospace Corp., Wright-Patterson AFB, OH.
- Susan Hagness (Ph.D., June 1998). Tenured full professor, Dept. of Electrical and Computer Engineering, University of Wisconsin, Madison, WI. Fellow, IEEE (2009).
- Elena Vasilyeva (Ph.D., June 2000). Senior electrical engineer, Raytheon Space and Airborne Systems, Arlington, TX.
- Veera Anantha (Ph.D., June 2001). Director of engineering, Wireless Valley, Inc., Austin, TX.
- Milica Popovic (Ph.D., August 2001). Tenured associate professor, Dept. of Electrical and Computer Engineering, McGill University, Montreal, Canada.
- Geoff Waldschmidt (Ph.D., June 2002). Electrical engineer, Accelerator Systems Division, Argonne National Laboratory, Argonne, IL.
- Adam Rybaltowski (Ph.D., October 2002). Optical projects manager, LightTime LLC, Oshkosh, WI.
- Shih-Hui (Gilbert) Chang (Ph.D., June 2004). Tenure-track assistant professor, Institute of Opto-Electronics for Science and Engineering, National Cheng Kung University, Tainan, Taiwan.

- Jiuan-Her (Grace) Chang (Ph.D., June 2004). Homemaker and mother.
- Zhigang Chen (Ph.D., June 2005). Electrical engineer, Applied Materials, Inc., Sunnyvale, CA.
- Snow Tseng (Ph.D., June 2005). Tenure-track assistant professor, National Taiwan University, Taipei, Taiwan.
- Xu Li (Postdoc, 2003-05). Tenure-track assistant professor, Depts. of Biomedical Engineering and Electrical Engineering and Computer Science, Northwestern University, Evanston, IL.
- Jamesina Simpson (Ph.D., June 2007). Tenure-track assistant professor, Dept. of Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM.
- Jethro Greene (Ph.D., June 2007). Senior analyst, Citadel Financial, Chicago, IL.
- Alex Heifetz (Postdoc, 2007-08). Postdoc, Argonne National Laboratory, Argonne, IL.
- Soon-Cheol Kong (Postdoc, 2007-09). Member, technical staff, HyPerComp, Inc., Westlake Village, CA.

### ADVISEES' MAJOR EXTERNAL FELLOWSHIPS

1. Susan Hagness, Barry Goldwater Undergraduate Fellowship, 1992.
2. Susan Hagness, National Science Foundation Graduate Fellowship, 1993.
3. Jamesina Simpson, National Science Foundation Graduate Fellowship, 2005.
4. Kevin Huang, National Science Foundation Graduate Fellowship, 2007.
5. Kevin Huang, Department of Energy Computational Science Graduate Fellowship, 2007.
6. Alexander Heifetz, *Ultra Early Detection of Cell Carcinogenesis via Partial Wave Spectroscopy*, American Cancer Society/Canary Foundation Postdoctoral Fellowship in Early Detection, 2007-2010.
7. Alexander Heifetz, Argonne National Laboratory Director's Postdoctoral Fellowship, 2009.

### U.S. PATENTS

1. J. E. Bridges, A. Taflove and R. H. Snow, "Method for *in situ* heat processing of hydrocarbonaceous formations," 4,140,180 (Feb. 20, 1979).
2. J. E. Bridges, A. Taflove and R. H. Snow, "Apparatus and method for *in situ* heat processing of hydrocarbonaceous formations," 4,144,935 (March 20, 1979).
3. J. E. Bridges and A. Taflove, "Apparatus and method for *in situ* heat processing of hydrocarbonaceous formations," Re 30,738 (Sept. 8, 1981).
4. J. E. Bridges and A. Taflove, "Apparatus and method for *in situ* controlled heat processing of hydrocarbonaceous formations," 4,449,585 (May 22, 1984)
5. J. E. Bridges and A. Taflove, "Method and apparatus for mitigation of radio frequency electric field peaking in controlled heat processing of hydrocarbonaceous formations *in situ*," 4,476,926 (Oct. 16, 1984).
6. J. E. Bridges, G. C. Sresty and A. Taflove, "Single well stimulation for the recovery of liquid hydrocarbons from subsurface formations," 4,524,827 (June 25, 1985).
7. J. E. Bridges and A. Taflove, "Conduction heating of hydrocarbonaceous formations," 4,545,435 (Oct. 8, 1985).
8. J. E. Bridges, G. C. Sresty and A. Taflove, "Electro-osmotic production of hydrocarbons utilizing conduction heating of hydrocarbonaceous formations," 4,645,004 (Feb. 21, 1987).
9. G. C. Sresty, A. Taflove and K. R. Umashankar, "Method and apparatus for enhancing liquid hydrocarbon production from a single borehole in a slowly producing formation by non-uniform heating through optimized electrode arrays surrounding the borehole," 4,662,438 (May 5, 1987).
10. J. E. Bridges, A. Taflove, H. Dev and R. H. Snow, "*In situ* decontamination of spills and landfills by radio frequency heating," 4,670,634 (June 2, 1987).
11. J. E. Bridges, G. C. Sresty, and A. Taflove, "Method and apparatus for treating hazardous wastes or other hydrocarbonaceous material," 5,487,873 (Jan. 30, 1996).
12. J. E. Bridges, A. Taflove, S. C. Hagness, and A. V. Sahakian, "Microwave antenna for cancer detection system," 6,061,589 (May 9, 2000).
13. A. Taflove and E. Vasilyeva, "Elongate radiator conformal antenna for portable communications devices," 6,292,144 (Sept. 18, 2001).

14. J. E. Bridges, S. C. Hagness, A. Taflove, and M. Popovic, "Microwave discrimination between malignant and benign breast tumors," 6,421,550 (July 16, 2002).

## BOOKS

Approximately 6,050 total citations for Books #2, #3, #4, and #5 as of 12/31/2009.

See bar chart on Page 11 for year-by-year distribution of citations. [Data source](#): ISI Web of Science®

1. K. R. Umashankar and A. Taflove, *Computational Electromagnetics: Integral Equation Approach*. Norwood, MA: Artech House, 1993.
2. A. Taflove, *Computational Electrodynamics: The Finite-Difference Time-Domain Method*. Norwood, MA: Artech House, 1995.
3. A. Taflove, editor, *Advances in Computational Electrodynamics: The Finite-Difference Time-Domain Method*. Norwood, MA: Artech House, 1998.
4. A. Taflove and S. C. Hagness, *Computational Electrodynamics: The Finite-Difference Time-Domain Method*, 2nd edition. Norwood, MA: Artech House, 2000.
5. A. Taflove and S. C. Hagness, *Computational Electrodynamics: The Finite-Difference Time-Domain Method*, 3rd edition. Norwood, MA: Artech House, 2005.

## INVITED CHAPTERS AND PAPERS IN BOOKS

1. A. Taflove and K. R. Umashankar, "A Hybrid Moment Method / Finite-Difference Time-Domain Approach to Electromagnetic Coupling and Aperture Penetration into Complex Geometries," Chap. 14 in *Applications of the Method of Moments to Electromagnetic Fields*, B. J. Strait, ed. Orlando, Florida: SCEE Press (1980).
2. A. Taflove and K. R. Umashankar, "Solution of Complex Electromagnetic Penetration and Scattering Problems in Unbounded Regions," pp. 83-113 in *Computational Methods for Infinite Domain Media-Structure Interactions*, American Society of Mechanical Engineers, AMD Vol. 46 (1981).
3. A. Taflove and K. R. Umashankar, "Detailed Near/Far Field Modeling of Complex Electrically-Large Three-Dimensional Structures," Chap. II.10 in *Inverse Methods in Electromagnetic Imaging, Part I*, W.-M. Boerner, ed., NATO Advanced Science Institutes Series C, vol. 143. Dordrecht, Netherlands: Reidel (1985).
4. A. Taflove and K. R. Umashankar, "Review of FDTD Numerical Modeling of Electromagnetic Wave Scattering and Radar Cross Section," in *Radar Cross Sections of Complex Objects*, W. R. Stone, ed. New York: IEEE Press (1990).
5. A. Taflove and K. R. Umashankar, "The Finite-Difference Time-Domain Method for Numerical Modeling of Electromagnetic Wave Interactions with Arbitrary Structures," Chap. 8 in *Progress in Electromagnetics Research 2: Finite Element and Finite Difference Methods in Electromagnetic Scattering*, M. A. Morgan, ed. New York: Elsevier (1990).
6. A. Taflove, "State of the Art and Future Directions in Finite-Difference and Related Techniques in Supercomputing Computational Electromagnetics," pp. 197-213 in *Directions in Electromagnetic Wave Modeling*, H. L. Bertoni and L. B. Felsen, eds. New York: Plenum (1991).
7. J. P. Brooks, K. K. Ghosh, E. Harrigan D. S. Katz and A. Taflove, "Progress in Cray-Based Algorithms for Computational Electromagnetics," Chap. 2 in *Progress in Electromagnetics Research*, vol. 7, T. Cwik and J. Patterson, eds. Cambridge, MA: EMW Publishing (1993).
8. A. Taflove, "Advances in Finite-Difference Time-Domain Methods for Engineering Electromagnetics," in *Ultra-Wideband Short-Pulse Electromagnetics*, vol. 2, H. L. Bertoni, L. Carin, L. B. Felsen, and S. U. Pillai, eds. New York: Plenum (1995).
9. S. C. Hagness, S.-T. Ho, and A. Taflove, "Finite-Difference Time-Domain (FDTD) Computational Electrodynamics Simulations of Microlaser Cavities in One and Two Spatial Dimensions," in *Computational Electromagnetics and its Applications*, T. G. Campbell, R. A. Nicolaides, and M. D. Salas, eds. (ICASE/LaRC Interdisciplinary Series in Science and Engineering, Vol. 5). Dordrecht, Netherlands: Kluwer (1997).
10. V. Sathiseelan, B. B. Mittal, A. J. Fenn, and A. Taflove, "Recent Advances in External Electromagnetic Hyperthermia," Chap. 10 (pp. 213-245) in *Advances in Radiation Therapy*, B. B. Mittal, J. A. Purdy, and K. K. Ang, eds., part of the series *Cancer Treatment and Research*, S. T. Rosen, series ed. Dordrecht, Netherlands: Kluwer (1998).
11. A. Taflove, "Numerical Issues Regarding FDTD Modeling of Microwave Structures," in *Time Domain Methods for Microwave Structures: Analysis and Design*, B. Houshmand and T. Itoh, eds. New York: IEEE Press (1998).

12. A. Taflove, S. C. Hagness, and M. J. Piket-May, "Computational Electromagnetics: The Finite-Difference Time-Domain Method," Chap. V.9 (pp. 629-670) in *The Electrical Engineering Handbook*, W.-K. Chen, ed. Burlington, MA: Elsevier Academic Press (2005).
13. S. C. Hagness, A. Taflove, and S. D. Gedney, "Finite-Difference Time-Domain Methods," *Handbook of Numerical Analysis Vol. XIII: Numerical Methods in Electromagnetics*, W. H. A. Schilders and E. J. W. ter Maten, eds. Amsterdam, Netherlands: Elsevier North Holland, pp. 199-315 (2005).
14. A. Taflove and S. C. Hagness, "Finite-Difference Time-Domain Analysis," in *Encyclopedia of RF and Microwave Engineering*, Vol. 2, K. Chang, ed. Hoboken, NJ: Wiley, pp. 1567-1589 (2005).
15. S. H. Tseng, I. R. Capoglu, A. Taflove, and V. Backman, "Modeling of Light Scattering by Biological Tissues via Computational Solution of Maxwell's Equations," Chap. 3 (pp. 49-75) in *Biomedical Applications of Light Scattering*, A. Wax and V. Backman, eds. New York: McGraw Hill (2010).

### REFEREED JOURNAL PUBLICATIONS

Approximately 4,700 total citations as of 12/31/2009, averaging ~37 citations per refereed journal paper.  $h$ -index = 34. See bar chart on Page 11 for year-by-year distribution of citations. [Data source](#): ISI Web of Science®

\*Denotes 18 papers, each with  $\geq 100$  citations. \*Denotes remaining 16  $h$ -index papers.

1. A. Taflove and M. E. Brodwin, "A radio frequency tunable active filter," *IEEE J. Solid State Circuits*, vol. 9, pp. 73-76, April 1974.
- \*2. A. Taflove and M. E. Brodwin, "Numerical solution of steady-state electromagnetic scattering problems using the time-dependent Maxwell's equations," *IEEE Trans. Microwave Theory Tech.*, vol. 23, pp. 623-630, Aug. 1975.
- \*3. A. Taflove and M. E. Brodwin, "Computation of the electromagnetic fields and induced temperatures within a model of the microwave-irradiated human eye," *IEEE Trans. Microwave Theory Tech.*, vol. 23, pp. 888-896, Nov. 1975.
4. M. E. Brodwin, A. Taflove, and J. E. Matz, "A passive electrodeless method for determining the interior field of biological materials," *IEEE Trans. Microwave Theory Tech.*, vol. 24, pp. 514-521, Aug. 1976.
5. A. Taflove and J. Dabkowski, "Prediction method for buried pipeline voltages due to 60 Hz ac inductive coupling. Part I – Analysis; Part II – Field test verification," *IEEE Trans. Power Apparatus and Systems*, vol. 98, pp. 780-794, May/June 1979.
6. A. Taflove, J. Dabkowski, and M. Genge, "Mitigation of buried pipeline voltages due to 60 Hz ac inductive coupling. Part I - Design of joint rights of way; Part II - Pipeline grounding methods," *IEEE Trans. Power Apparatus and Systems*, vol. 98, pp. 1806-1823, Sept./Oct. 1979.
- \*7. A. Taflove, "Application of the finite-difference time-domain method to sinusoidal steady-state electromagnetic penetration problems," *IEEE Trans. Electromagnetic Compatibility*, vol. 22, pp. 191-202, Aug. 1980.
- \*8. A. Taflove and K. R. Umashankar, "A hybrid moment method / finite-difference time-domain approach to electromagnetic coupling and aperture penetration into complex geometries," *IEEE Trans. Antennas and Propagation*, vol. 30, pp. 617-627, July 1982.
- \*9. K. R. Umashankar and A. Taflove, "A novel method to analyze electromagnetic scattering of complex objects," *IEEE Trans. Electromagnetic Compatibility*, vol. 24, pp. 397-405, Nov. 1982.
- \*10. A. Taflove and K. R. Umashankar, "Radar cross section of general three-dimensional scatterers," *IEEE Trans. Electromagnetic Compatibility*, vol. 25, pp. 433-440, Nov. 1983.
- \*11. A. Taflove, K. R. Umashankar, and T. G. Jurgens, "Validation of FD-TD modeling of the radar cross section of three-dimensional structures spanning up to 9 wavelengths," *IEEE Trans. Antennas and Propagation*, vol. 33, pp. 662-666, June 1985.
12. A. Taflove, J. H. Dunlap, and R. A. Zalewski, "Testing of railroad signal equipment for power line interference susceptibility. Part I - The test jig; Part II - Test results," *IEEE Trans. Power Apparatus and Systems*, vol. 104, pp. 3345-3359, Dec. 1985.
- \*13. K. R. Umashankar, A. Taflove, and S. M. Rao, "Electromagnetic scattering by arbitrary shaped three-dimensional homogeneous lossy dielectric objects," *IEEE Trans. Antennas and Propagation*, vol. 34, pp. 758-766, June 1986.
- \*14. G. A. Kriegsmann, A. Taflove, and K. R. Umashankar, "A new formulation of electromagnetic wave scattering using an on-surface radiation boundary condition approach," *IEEE Trans. Antennas and Propagation*, vol. 35, pp. 153-161, Feb. 1987.

- \*15. A. Taflove and K. R. Umashankar, "The finite-difference time-domain (FD-TD) method for electromagnetic scattering and interaction problems," invited paper, *J. Electromagnetic Waves and Applications*, vol. 1, pp. 243-267, 1987.
- \*16. K. R. Umashankar, A. Taflove, and B. Beker, "Calculation and experimental validation of induced currents on coupled wires in an arbitrary shaped cavity," *IEEE Trans. Antennas and Propagation*, vol. 35, pp. 1248-1257, Nov. 1987.
- \*17. A. Taflove, K. R. Umashankar, B. Beker, F. A. Harfoush, and K. S. Yee, "Detailed FD-TD analysis of electromagnetic fields penetrating narrow slots and lapped joints in thick conducting screens," *IEEE Trans. Antennas and Propagation*, vol. 36, pp. 247-257, Feb. 1988.
- \*18. D. M. Sullivan, O. P. Gandhi, and A. Taflove, "Use of the finite-difference time-domain method in calculating EM absorption in man models," *IEEE Trans. Biomedical Engineering*, vol. 35, pp. 179-186, March 1988.
- 19. T. G. Moore, G. A. Kriegsmann, and A. Taflove, "An application of the WKBJ technique to the on-surface radiation condition," *IEEE Trans. Antennas and Propagation*, vol. 36, pp. 1329-1331, Sept. 1988.
- \*20. T. G. Moore, J. G. Blaschak, A. Taflove, and G. A. Kriegsmann, "Theory and application of radiation boundary operators," invited review paper, *IEEE Trans. Antennas and Propagation*, vol. 36, pp. 1797-1812, Dec. 1988.
- \*21. A. Taflove, "Review of the formulation and applications of the finite-difference time-domain method for numerical modeling of electromagnetic wave interactions with arbitrary structures," invited paper, *Wave Motion*, vol. 10, pp. 547-582, Dec. 1988.
- 22. F. A. Harfoush, A. Taflove, and G. A. Kriegsmann, "A numerical technique for analyzing electromagnetic wave scattering from moving surfaces in one and two dimensions," *IEEE Trans. Antennas and Propagation*, vol. 37, pp. 55-63, Jan. 1989.
- 23. J. G. Blaschak, G. A. Kriegsmann, and A. Taflove, "A study of wave interactions with flanged waveguides and cavities using the on-surface radiation condition method," *Wave Motion*, vol. 11, pp. 65-76, March 1989.
- \*24. A. Taflove and K. R. Umashankar, "Review of FD-TD numerical modeling of electromagnetic wave scattering and radar cross section," invited paper, *Proc. IEEE*, vol. 77 (Special Issue on Radar Cross Sections of Complex Objects), pp. 682-699, May 1989.
- 25. A. Taflove and K. R. Umashankar, "The finite-difference time-domain method for numerical modeling of electromagnetic scattering," invited paper, *IEEE Trans. Magnetics*, vol. 25 (Special Issue on Field Computation), pp. 3086-3091, July 1989.
- 26. A. T. Perlik, A. Taflove, and T. Opsahl, "Predicting scattering of electromagnetic fields using FDTD on a Connection Machine," *IEEE Trans. Magnetics*, vol. 25 (Special Issue on Field Computation), pp. 2910-2912, July 1989.
- 27. B. Beker, K. R. Umashankar, and A. Taflove, "Numerical analysis and validation of the combined-field surface integral equations for electromagnetic scattering by arbitrary shaped two-dimensional anisotropic objects," *IEEE Trans. Antennas and Propagation*, vol. 37, pp. 1573-1581, Dec. 1989.
- \*28. A. Taflove and K. R. Umashankar, "The finite-difference time-domain method for numerical modeling of electromagnetic wave interactions," invited paper, *Electromagnetics*, vol. 10 (Special Issue on Three-Dimensional Electromagnetic Computation), pp. 105-126, Jan. - June 1990.
- 29. M. A. Strickel and A. Taflove, "Time-domain synthesis of broadband absorptive coatings for two-dimensional conducting targets," *IEEE Trans. Antennas and Propagation*, vol. 38, pp. 1084-1091, July 1990.
- 30. F. A. Harfoush, G. A. Kriegsmann, and A. Taflove, "Numerical implementation of relativistic electromagnetic field boundary conditions in a laboratory-frame grid," *J. Computational Physics*, vol. 89, pp. 80-94, July 1990.
- 31. S. Arendt, K. R. Umashankar, A. Taflove, and G. A. Kriegsmann, "Extension of on-surface radiation condition theory to scattering by two-dimensional homogeneous dielectric objects," *IEEE Trans. Antennas and Propagation*, vol. 38, pp. 1551-1558, Oct. 1990.
- 32. B. Beker, K. R. Umashankar, and A. Taflove, "Electromagnetic scattering by arbitrarily shaped two-dimensional perfectly conducting objects coated with homogeneous anisotropic materials," *Electromagnetics*, vol. 10, pp. 387-406, Oct. - Dec. 1990.
- 33. F. A. Harfoush and A. Taflove, "Scattering of electromagnetic waves by a material half-space with a time-varying conductivity," *IEEE Trans. Antennas and Propagation*, vol. 39, pp. 898-906, July 1991.
- 34. D. S. Katz, A. Taflove, M. J. Picket-May, and K. R. Umashankar, "FDTD analysis of electromagnetic wave radiation from systems containing horn antennas," *IEEE Trans. Antennas and Propagation*, vol. 39, pp. 1203-1212, Aug. 1991.

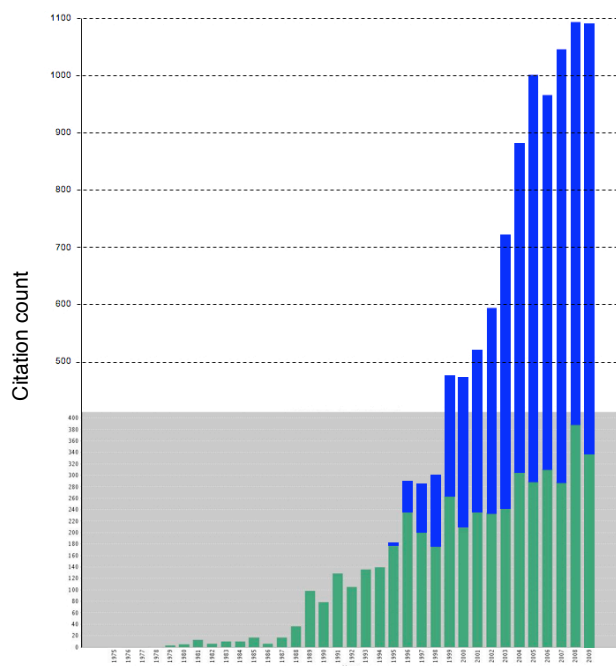
- \*35. R. M. Joseph, S. C. Hagness, and A. Taflove, "Direct time integration of Maxwell's equations in linear dispersive media with absorption for scattering and propagation of femtosecond electromagnetic pulses," *Optics Lett.*, vol. 16, pp. 1412-1414, Sept. 15, 1991.
- 36. K. R. Umashankar, W. Chun, and A. Taflove, "Simple analytical solution to electromagnetic scattering by two-dimensional conducting objects with edges and corners. Part I - TM polarization," *IEEE Trans. Antennas and Propagation*, vol. 39, pp. 1665-1671, Dec. 1991.
- \*37. P. M. Goorjian and A. Taflove, "Direct time integration of Maxwell's equations in nonlinear dispersive media for propagation and scattering of femtosecond electromagnetic solitons," *Optics Lett.*, vol. 17, pp. 180-182, Feb. 1, 1992.
- 38. M. J. Piket-May, A. Taflove, W. C. Lin, D. S. Katz, V. Sathiaselalan, and B. B. Mittal, "Initial results for automated computational modeling of patient-specific electromagnetic hyperthermia," *IEEE Trans. Biomedical Engineering*, vol. 39, pp. 226-237, March 1992.
- \*39. T. G. Jurgens, A. Taflove, K. R. Umashankar, and T. G. Moore, "Finite-difference time-domain modeling of curved surfaces," *IEEE Trans. Antennas and Propagation*, vol. 40, pp. 357-366, April 1992.
- 40. K. R. Umashankar, S. Nimmagadda, and A. Taflove, "Numerical analysis of electromagnetic scattering by electrically large objects using spatial decomposition technique," *IEEE Trans. Antennas and Propagation*, vol. 40, pp. 867-877, Aug. 1992.
- \*41. P. M. Goorjian, A. Taflove, R. M. Joseph, and S. C. Hagness, "Computational modeling of femtosecond optical solitons from Maxwell's equations," *IEEE J. Quantum Electronics*, vol. 28 (Special Issue on Ultrafast Optics and Electronics), pp. 2416-2422, Oct. 1992.
- 42. A. Taflove, "Re-inventing electromagnetics: supercomputing solution of Maxwell's equations via direct time integration on space grids," *Computing Systems in Engineering*, vol. 3 (Special Issue on High-Performance Computing for Flight Vehicles), pp. 153-168, Dec. 1992.
- 43. V. Sathiaselalan, A. Taflove, M. J. Piket-May, C. E. Reuter, and B. B. Mittal, "Application of numerical modeling techniques in electromagnetic hyperthermia," *J. Applied Computational Electromagnetics Society*, vol. 7 (Special Issue on Bioelectromagnetic Computations), pp. 61-71, Winter 1992.
- \*44. R. M. Joseph, P. M. Goorjian, and A. Taflove, "Direct time integration of Maxwell's equations in 2-D dielectric waveguides for propagation and scattering of femtosecond electromagnetic solitons," *Optics Lett.*, vol. 18, pp. 491-493, April 1, 1993.
- 45. M. J. Piket-May, A. Taflove, and J. B. Troy, "Electrodynamics of visible light interactions with the vertebrate retinal rod," *Optics Lett.*, vol. 18, pp. 568-570, April 15, 1993.
- \*46. T. G. Jurgens and A. Taflove, "Three-dimensional contour FDTD modeling of scattering from single and multiple bodies," *IEEE Trans. Antennas and Propagation*, vol. 41, pp. 1703-1708, Dec. 1993.
- 47. K. R. Umashankar, S. Chaudhuri, and A. Taflove, "Finite-difference time-domain formulation of an inverse scattering scheme for remote sensing of inhomogeneous lossy layered media," *J. Electromagn. Waves Apps.*, vol. 8, pp. 489-508, April 1994.
- 48. M. Strickel, A. Taflove, and K. R. Umashankar, "Finite-difference time-domain formulation of an inverse scattering scheme for remote sensing of conducting and dielectric targets," *J. Electromagn. Waves Apps.*, vol. 8, pp. 509-529, April 1994.
- \*49. V. A. Thomas, M. E. Jones, M. J. Piket-May, A. Taflove, and E. Harrigan, "The use of SPICE lumped circuits as sub-grid models for FDTD analysis," *IEEE Microwave and Guided Wave Lett.*, vol. 4, pp. 141-143, May 1994.
- 50. E. Thiele and A. Taflove, "Finite-difference time-domain modeling of Vivaldi slot antennas and arrays," *IEEE Trans. Antennas and Propagation*, vol. 42, pp. 633-641, May 1994.
- \*51. D. S. Katz, E. T. Thiele, and A. Taflove, "Validation and extension to three dimensions of the Berenger PML absorbing boundary condition for FDTD meshes," *IEEE Microwave and Guided Wave Lett.*, vol. 4, pp. 268-270, Aug. 1994.
- \*52. M. J. Piket-May, A. Taflove, and J. Baron, "FD-TD modeling of digital signal propagation in 3-D circuits with passive and active loads," *IEEE Trans. Microwave Theory and Techniques*, vol. 42, pp. 1514-1523, Aug. 1994.
- \*53. C. E. Reuter, R. M. Joseph, E. T. Thiele, D. S. Katz, and A. Taflove, "Ultrawideband absorbing boundary condition for termination of waveguiding structures in FD-TD simulations," *IEEE Microwave and Guided Wave Lett.*, vol. 4, pp. 344-346, Oct. 1994.
- 54. R. M. Joseph and A. Taflove, "Spatial soliton deflection mechanism indicated by FDTD Maxwell's equations modeling," *IEEE Photonics Technology Lett.*, vol. 6, pp. 1251-1254, Oct. 1994.

55. J. P. Zhang, D. Y. Chu, S. L. Wu, W. G. Bi, R. C. Tiberio, R. M. Joseph, A. Taflove, C. W. Tu, and S.-T. Ho, "Nanofabrication of 1-D photonic bandgap structures along a photonic wire," *IEEE Photonics Technology Lett.*, vol. 8, pp. 491-493, April 1996.
56. S. C. Hagness, R. M. Joseph, and A. Taflove, "Subpicosecond electrodynamics of distributed Bragg reflector microlasers: Results from finite-difference time-domain simulations," *Radio Science*, vol. 31, pp. 931-941, July-Aug. 1996.
- \*57. R. M. Joseph and A. Taflove, "FDTD Maxwell's equations models for nonlinear electrodynamics and optics," invited paper, *IEEE Trans. Antennas and Propagation*, vol. 45, pp. 364-374, March 1997.
- \*58. D. Rafizadeh, J. P. Zhang, S. C. Hagness, A. Taflove, K. A. Stair, S. T. Ho, and R. C. Tiberio, "Waveguide-coupled AlGaAs/GaAs microcavity ring and disk resonators with high finesse and 21.6-nm free-spectral range," *Optics Lett.*, vol. 22, pp. 1244-1246, Aug. 15, 1997.
59. S. C. Hagness, A. Taflove, and J. E. Bridges, "Wideband ultralow reverberation antenna for biological sensing," *Electronics Lett.*, vol. 33, pp. 1594-1595, Sept. 11, 1997.
60. G. Stratis, V. Anantha, and A. Taflove, "Numerical calculation of diffraction coefficients of generic conducting and dielectric wedges using FDTD," *IEEE Trans. Antennas and Propagation*, vol. 45, pp. 1525-1529, Oct. 1997.
- \*61. S. C. Hagness, D. Rafizadeh, S. T. Ho, and A. Taflove, "FDTD microcavity simulations: Design and experimental realization of waveguide-coupled single-mode ring and whispering-gallery-mode disk resonators," *J. Lightwave Technology*, vol. 15, pp. 2154-2165, Nov. 1997.
62. C. E. Reuter, A. Taflove, V. Sathiseelan, M. Piket-May, and B. B. Mittal, "Unexpected physical phenomena indicated by FDTD modeling of the Sigma-60 deep hyperthermia applicator," *IEEE Trans. Microwave Theory and Techniques*, vol. 46, pp. 313-319, April 1998.
63. M. Popovic, S. C. Hagness, and A. Taflove, "FDTD analysis of a complete TEM cell loaded with liquid biological media in culture dishes," *IEEE Trans. Biomedical Engineering*, vol. 45, pp. 1067-1076, Aug. 1998.
64. E. Vasilyeva and A. Taflove, "Three-dimensional modeling of amplitude-object imaging in scanning near-field optical microscopy," *Optics Lett.*, vol. 23, no. 15, pp. 1155-1157, Aug. 1, 1998.
65. V. Anantha and A. Taflove, "Calculation of diffraction coefficients of three-dimensional infinite conducting wedges using FDTD," *IEEE Trans. Antennas and Propagation*, vol. 46, pp. 1755-1756, Nov. 1998.
- \*66. S. C. Hagness, A. Taflove, and J. E. Bridges, "Two-dimensional FDTD analysis of a pulsed microwave confocal system for breast cancer detection: Fixed-focus and antenna-array sensors," *IEEE Trans. Biomedical Engineering*, vol. 45, pp. 1470-1479, Dec. 1998.
- \*67. S. C. Hagness, A. Taflove, and J. E. Bridges, "Three-dimensional FDTD analysis of a pulsed microwave confocal system for breast cancer detection: Design of an antenna-array element," *IEEE Trans. Antennas and Propagation*, vol. 47, pp. 783-791, May 1999.
68. G. Waldschmidt and A. Taflove, "The determination of the effective radius of a filamentary source in the FDTD mesh," *IEEE Microwave and Guided Wave Lett.*, vol. 10, pp. 217-219, June 2000.
69. A. Rybaltowski and A. Taflove, "Signal-to-noise ratio in direct-detection mid-infrared random-modulation continuous-wave lidar in the presence of colored additive noise," *Optics Express*, vol. 9, no. 8, pp. 386-399, Oct. 8, 2001.
70. T. A. Kuiken, N. S. Stoykov, M. Popovic, M. Lowery, and A. Taflove, "Finite element modeling of electromagnetic signal propagation in a phantom arm," *IEEE Trans. Neural Systems and Rehabilitation Engineering*, vol. 9, pp. 346-354, Dec. 2001.
- \*71. M. M. Lowery, N. S. Stoykov, A. Taflove, and T. A. Kuiken, "A multiple-layer finite-element model of the surface EMG signal," *IEEE Trans. Biomedical Engineering*, vol. 49, pp. 446-454, May 2002.
72. N. S. Stoykov, M. M. Lowery, A. Taflove, and T. A. Kuiken, "Frequency- and time-domain FEM models of EMG: Capacitive effects and aspects of dispersion," *IEEE Trans. Biomedical Engineering*, vol. 49, pp. 763-772, Aug. 2002.
73. J. J. Simpson and A. Taflove, "Two-dimensional FDTD modeling of impulsive ELF antipodal propagation and Schumann resonance of the Earth-sphere," *IEEE Antennas and Wireless Propagation Lett.*, vol. 1, pp. 53-56, 2002.
74. V. Anantha and A. Taflove, "Efficient modeling of infinite scatterers using a generalized total-field / scattered-field FDTD boundary partially embedded within PML," *IEEE Trans. Antennas and Propagation*, vol. 50, pp. 1337-1349, Oct. 2002.

75. Z. Chen, A. Taflove, and V. Backman, "Equivalent volume-averaged light scattering behavior of randomly inhomogeneous dielectric spheres in the resonant range," *Optics Lett.*, vol. 28, no. 10, pp. 765-767, May 15, 2003.
76. N. S. Stoykov, T. A. Kuiken, M. M. Lowery, and A. Taflove, "Finite-element time-domain algorithms for modeling linear Debye and Lorentz dielectric dispersions at low frequencies," *IEEE Trans. Biomedical Engineering*, vol. 50, pp. 1100-1107, Sept. 2003.
77. J. H. Greene and A. Taflove, "Initial three-dimensional FDTD phenomenology study of the transient response of a large vertically coupled photonic racetrack," *Optics Lett.*, vol. 28, no. 19, pp. 1733-1735, Oct. 1, 2003.
78. Z. Chen, A. Taflove, and V. Backman, "Concept of the equiphase sphere for light scattering by nonspherical dielectric particles," *J. Optical Society of America A*, vol. 21, no. 1, pp. 88-97, Jan. 2004.
79. J. J. Simpson and A. Taflove, "Three-dimensional FDTD modeling of impulsive ELF propagation about the Earth-sphere," *IEEE Trans. Antennas and Propagation*, vol. 52, pp. 443-451, Feb. 2004.
- \*80. Z. Chen, A. Taflove, and V. Backman, "Photonic nanojet enhancement of backscattering of light by nanoparticles: A potential novel visible-light ultramicroscopy technique," *Optics Express*, vol. 12, no. 7, pp. 1214-1220, April 5, 2004.
81. S.-H. Chang, A. Taflove, A. Yamilov, A. Burin, and H. Cao, "Numerical study of light correlations in a random medium close to the Anderson localization threshold," *Optics Lett.*, vol. 29, no. 9, pp. 917-919, May 1, 2004.
82. X. Li, Z. Chen, J. Gong, A. Taflove, and V. Backman, "Analytical techniques for addressing forward and inverse problems of light scattering by irregularly shaped particles," *Optics Lett.*, vol. 29, no. 11, pp. 1239-1241, June 1, 2004.
83. S. H. Tseng, J. H. Greene, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "Exact solution of Maxwell's equations for optical interactions with a macroscopic random medium," *Optics Lett.*, vol. 29, no. 12, pp. 1393-1395, June 15, 2004. (See also Addendum: *Optics Lett.*, vol. 30, no. 1, pp. 56-57, Jan. 1, 2005.)
84. J. J. Simpson, A. Taflove, J. A. Mix, and H. Heck, "Computational and experimental study of a microwave electromagnetic bandgap structure with waveguiding defect for potential use as a bandpass wireless interconnect," *IEEE Microwave and Wireless Components Lett.*, vol. 14, pp. 343-345, July 2004.
85. G. Waldschmidt and A. Taflove, "Three-dimensional CAD-based mesh generator for the Dey-Mittra conformal FDTD algorithm," *IEEE Trans. Antennas and Propagation*, vol. 52, pp. 1658-1664, July 2004.
86. N. S. Stoykov, J. W. Jerome, L. C. Pierce, and A. Taflove, "Computational modeling evidence of a nonthermal electromagnetic interaction mechanism with living cells: Microwave nonlinearity in the cellular sodium ion channel," *IEEE Trans. Microwave Theory and Techniques*, vol. 52, pp. 2040-2045, Aug. 2004. (See also Corrections: *IEEE Trans. Microwave Theory Tech.*, vol. 56, p. 1009, April 2008.)
87. A. Rybaltowski and A. Taflove, "Superior signal-to-noise ratio of a new AA1 sequence for random-modulation continuous-wave lidar," *Optics Lett.*, vol. 29, no. 15, pp. 1709-1711, Aug. 1, 2004.
88. S.-H. Chang and A. Taflove, "Finite-difference time-domain model of lasing action in a four-level two-electron atomic system," *Optics Express*, vol. 12, no. 16, pp. 3827-3833, Aug. 9, 2004.
89. X. Li, Z. Chen, A. Taflove, and V. Backman, "Equiphase-sphere approximation for analysis of light scattering by arbitrarily-shaped nonspherical particles," *Applied Optics*, vol. 43, no. 23, pp. 4497-4505, Aug. 10, 2004.
90. M. Popovic and A. Taflove, "Two-dimensional FDTD inverse-scattering scheme for determination of near-surface material properties at microwave frequencies," *IEEE Trans. Antennas and Propagation*, vol. 52, pp. 2366-2373, Sept. 2004.
91. J. J. Simpson and A. Taflove, "Efficient modeling of impulsive ELF antipodal propagation about the Earth sphere using an optimized two-dimensional geodesic FDTD grid," *IEEE Antennas and Wireless Propagation Lett.*, vol. 3, pp. 215-218, 2004.
92. X. Li, Z. Chen, A. Taflove, and V. Backman, "Equiphase-sphere approximation for light scattering by stochastically inhomogeneous microparticles," *Physical Review E*, vol. 70, 056610, Nov. 17, 2004.
93. K. Chen, A. Taflove, Y. L. Kim, and V. Backman, "Self-assembled patterns of nanospheres with symmetries from submicrons to centimeters," *Applied Physics Lett.*, vol. 86, 033101, Jan. 17, 2005 (cover article). (Also published in *Virtual Journal of Biological Physics Research*, vol. 9, issue 2.)
94. X. Li, A. Taflove, and V. Backman, "Modified FDTD near-to-far field transformation for improved backscattering calculation of strongly forward-scattering objects," *IEEE Antennas and Wireless Propagation Lett.*, vol. 4, pp. 35-38, 2005.
95. X. Li, Z. Chen, A. Taflove, and V. Backman, "Optical analysis of nanoparticles via enhanced backscattering facilitated by 3-D photonic nanojets," *Optics Express*, vol. 13, pp. 526-533, Jan. 24, 2005.

96. A. Yamilov, S.-H. Chang, A. Burin, A. Taflove, and H. Cao, "Field and intensity correlations in amplifying random media," *Physical Review B*, vol. 71, 092201, March 4, 2005.
97. J.-H. Chang and A. Taflove, "Three-dimensional diffraction by infinite conducting and dielectric wedges using a generalized total-field / scattered-field FDTD formulation," *IEEE Trans. Antennas and Propagation*, vol. 53, pp. 1444-1454, April 2005.
98. X. Li, A. Taflove, and V. Backman, "Quantitative analysis of depolarization of backscattered light by stochastically inhomogeneous dielectric particles," *Optics Lett.*, vol. 30, pp. 902-904, April 15, 2005. (Also published in *Virtual Journal of Biological Physics Research*, vol. 9, issue 9.)
99. J. J. Simpson and A. Taflove, "Electrokinetic effect of the Loma Prieta earthquake calculated by an entire-Earth FDTD solution of Maxwell's equations," *Geophysical Research Lett.*, vol. 32, L09302, May 10, 2005.
100. S. H. Tseng, Y. L. Kim, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "Simulation of enhanced backscattering of light by numerically solving Maxwell's equations without heuristic approximations," *Optics Express*, vol. 13, pp. 3666-3672, May 16, 2005.
101. X. Li, A. Taflove, and V. Backman, "Recent progress in exact and reduced-order modeling of light-scattering properties of complex structures," *IEEE J. Selected Topics in Quantum Electronics, Special Issue on Biophotonics*, vol. 11, pp. 759-765, July/August 2005.
102. S. H. Tseng, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "Investigation of the noise-like structures of the total scattering cross-section of random media," *Optics Express*, vol. 13, pp. 6127-6132, Aug. 8, 2005.
103. J. J. Simpson and A. Taflove, "A novel ELF radar for major oil deposits," *IEEE Geoscience and Remote Sensing Lett.*, vol. 3, pp. 36-39, Jan. 2006.
104. Z. Chen, A. Taflove, X. Li, and V. Backman, "Superenhanced backscattering of light by nanoparticles," *Optics Lett.*, vol. 31, pp. 196-198, Jan. 15, 2006. (Also published in *Virtual Journal for Biomedical Optics*, vol. 1, issue 2.)
105. Z. Chen, A. Taflove, and V. Backman, "Highly efficient optical coupling and transport phenomena in chains of dielectric microspheres," *Optics Lett.*, vol. 31, pp. 389-391, Feb. 1, 2006.
106. Z. Chen, X. Li, A. Taflove, and V. Backman, "Backscattering enhancement of light by nanoparticles positioned in localized optical intensity peaks," *Applied Optics*, vol. 45, pp. 633-638, Feb. 1, 2006.
107. S. H. Tseng, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "Extracting geometrical information of closely packed random media from multiply scattered light via a cross-correlation analysis," *IEEE Antennas and Wireless Propagation Lett.*, vol. 5, 2006, pp. 91-94, March 2006.
108. J. J. Simpson, A. Taflove, J. A. Mix, and H. Heck, "Substrate integrated waveguides optimized for ultrahigh-speed digital interconnects," *IEEE Trans. Microwave Theory and Techniques*, vol. 54, pp. 1983-1990, May 2006.
109. J. J. Simpson, R. P. Heikes, and A. Taflove, "FDTD modeling of a novel ELF radar for major oil deposits using a three-dimensional geodesic grid of the Earth-ionosphere waveguide," *IEEE Trans. Antennas and Propagation*, vol. 54, pp. 1734-1741, June 2006.
110. S. H. Tseng, A. Taflove, D. Maitland, and V. Backman, "Pseudospectral time domain simulations of multiple light scattering in three-dimensional macroscopic random media," *Radio Science*, vol. 41, RS4009, doi:10.1029/2005RS003408, July 2006.
111. J. H. Greene and A. Taflove, "General vector auxiliary differential equation finite-difference time-domain method for nonlinear optics," *Optics Express*, vol. 14, pp. 8305-8310, Sept. 1, 2006.
112. J. J. Simpson and A. Taflove, "ELF radar system proposed for localized D-region ionospheric anomalies," *IEEE Geoscience and Remote Sensing Lett.*, vol. 3, pp. 500-503, Oct. 2006.
113. A. Heifetz, K. Huang, A. Sahakian, X. Li, A. Taflove, and V. Backman, "Experimental confirmation of backscattering enhancement induced by a photonic jet," *Applied Physics Lett.*, vol. 89, 221118, Nov. 27, 2006.
114. A. Taflove, "A perspective on the 40-year history of FDTD computational electrodynamics," *Applied Computational Electromagnetics Society (ACES) Journal*, vol. 22, no. 1, pp. 1-21, March 2007.
115. X. Li, A. Taflove, and V. Backman, "Anomalous oscillations in the spectra of light backscattered by inhomogeneous microparticles," *Physical Review E*, vol. 75, 037601, March 2007. (Also published in *Virtual Journal of Biological Physics Research*, vol. 13, issue 6.)
116. J. J. Simpson and A. Taflove, "A review of progress in FDTD Maxwell's equations modeling of impulsive sub-ionospheric propagation below 300 kHz," *IEEE Trans. Antennas and Propagation*, vol. 55, pp. 1582-1590, June 2007.

117. J. H. Greene and A. Taflove, "Scattering of spatial optical solitons by subwavelength air holes," *IEEE Microwave and Wireless Components Lett.*, vol. 17, pp. 760-762, Nov. 2007.
118. A. Heifetz, J. J. Simpson, S.-C. Kong, A. Taflove, and V. Backman, "Subdiffraction optical resolution of a gold nanosphere located within the nanojet of a Mie-resonant dielectric microsphere," *Optics Express*, vol. 15, pp. 17334-17342, Dec. 10, 2007. (Also published in *Virtual Journal for Biomedical Optics*, vol. 3, issue 1.)
119. D. R. Cantrell, S. Inayat, A. Taflove, R. S. Ruoff, and J. B. Troy, "Incorporation of the electrode-electrolyte interface into finite-element models of metal microelectrodes," *J. Neural Engineering*, vol. 5, pp. 54-67, Jan. 2008.
120. J. Andreasen, H. Cao, A. Taflove, P. Kumar, and C. Cao, "Finite-difference time-domain simulation of thermal noise in open cavities," *Physical Review A*, vol. 77, 023810, Feb. 8, 2008.
121. S.-C. Kong, A. V. Sahakian, A. Heifetz, A. Taflove, and V. Backman, "Robust detection of deeply subwavelength pits in simulated optical data-storage disks using photonic jets," *Applied Physics Lett.*, vol. 92, 211102, May 26, 2008 (cover article).
122. S.-C. Kong, A. Sahakian, A. Taflove, and V. Backman, "Photonic nanojet-enabled optical data storage," *Optics Express*, vol. 16, pp. 13713-13719, Sept. 1, 2008.
123. I. Capoglu, A. Taflove, and V. Backman, "Generation of an incident focused light pulse in FDTD," *Optics Express*, vol. 16, pp. 19208-19220, Nov. 10, 2008.
124. H. Subramanian, P. Pradhan, Y. Liu, I. R. Capoglu, X. Li, J. D. Rogers, A. Heifetz, D. Kunte, H. K. Roy, A. Taflove, and V. Backman, "Optical methodology for detecting histologically unapparent nanoscale consequences of genetic alterations in biological cells," *Proc. National Academy of Sciences USA*, vol. 105, no. 51, pp. 20124-20129, Dec. 23, 2008.
125. S.-C. Kong, A. Taflove, and V. Backman, "Quasi one-dimensional light beam generated by a graded-index microsphere," *Optics Express*, vol. 17, pp. 3722-3731, March 2, 2009. (Also published in *Virtual Journal of Nanoscale Science & Technology*, vol. 19, issue 12.)
126. S.-C. Kong, A. V. Sahakian, A. Taflove, and V. Backman, "High-density optical data storage enabled by the photonic nanojet from a dielectric microsphere," *Japanese J. Applied Physics*, vol. 48, 03A008, March 23, 2009. (Also published in *Virtual Journal of Nanoscale Science & Technology*, vol. 19, issue 18.)
127. I. R. Capoglu, J. D. Rogers, A. Taflove, and V. Backman, "Accuracy of the Born approximation in calculating the scattering coefficient of biological continuous random media," *Optics Lett.*, vol. 34, pp. 2679-2681, Sept. 1, 2009. (Also published in *Virtual Journal for Biomedical Optics*, vol. 4, issue 11.)
128. A. Heifetz, S.-C. Kong, A. V. Sahakian, A. Taflove, and V. Backman, "Photonic nanojets," *J. Computational & Theoretical Nanoscience*, vol. 6, pp. 1979-1992, Sept. 2009.



**Year-By-Year Citation Distribution  
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## BEST-PAPER/THESIS RECOGNITIONS

1. A. Taflove, K. R. Umashankar and J. H. Dunlap, "Analysis and modeling of power transmission line inductive and ground current coupling to railroad communications and signal lines," *Proc. 1983 IEEE Intl. Symp. Electromagnetic Compatibility*, pp. 472-476, Washington, D.C., Aug. 1983. (\$500 Best Paper Award)
2. S. C. Hagness, A. Taflove, and J. E. Bridges, "FDTD analysis of a pulsed microwave confocal system for breast cancer detection," *Proc. 19th Intl. Conf. IEEE Engineering in Medicine and Biology Soc.*, Chicago, IL, Oct. 30 - Nov. 2, 1997. (Finalist, Whitaker Foundation Student Paper Competition)
3. S. C. Hagness, *FDTD Computational Electromagnetics Modeling of Microcavity Lasers and Resonant Optical Structures*, Best Ph.D. Dissertation, Northwestern University Department of Electrical and Computer Engineering, June 1998.
4. M. Popovic, A. Taflove and T. A. Kuiken, "FEM model of muscle fiber conduction relevant to Improvement of prosthetic devices," *Proc. 21st Ann. Meeting Bioelectromagnetics Soc.*, pp. 183-185, Long Beach, CA, June 1999. (Johnson Student Paper Award)
5. M. Popovic, A. Taflove, N. Stoykov, and T. A. Kuiken, "Phantom model and 3-D FEM simulations: Conduction of externally generated low-frequency signals through muscles," *Proc. 22nd Ann. Meeting Bioelectromagnetics Soc.*, pp. 109-111, Munich, Germany, June 2000. (EMF Therapeutics Clinical Application Award)
6. J. J. Simpson and A. Taflove, "Three-dimensional FDTD modeling of impulsive ELF propagation about the Earth-sphere," *IEEE Antennas and Propagation Soc. Intl. Symp.*, Columbus, OH, June 2003. (Finalist, Student Paper Competition)
7. S. H. Tseng, J. H. Greene, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "When photons meet cells: Rigorously solving Maxwell's equations for the problem of light scattering by macroscopic biological random media," \$500 Outstanding Poster Presentation Award, *Gordon Research Conferences, Lasers in Medicine & Biology*, July 2004.
8. S. H. Tseng, A. Taflove, D. Maitland, V. Backman, and J. T. Walsh, Jr., "A rigorous solution of Maxwell's equations for the problem of tissue optics," Best Student Paper Award, 2005 American Society of Laser Medicine and Surgery (ASLMS) Conference.
9. J. J. Simpson, *Three-Dimensional FDTD Modeling of Impulsive Electromagnetic Propagation in the Global Earth-Ionosphere Waveguide below 30 kHz*, Best Ph.D. Dissertation, Northwestern University Department of Electrical Engineering and Computer Science, June 2007.

## MAGAZINE ARTICLES

1. A. Taflove, "An analog-computer-type active filter," *QST*, vol. 59, pp. 26-27, May 1975.
2. A. Taflove and K. R. Umashankar, "Finite-difference time-domain (FDTD) modeling of electromagnetic wave scattering and interaction problems," *IEEE Antennas and Propagation Society Newsletter*, vol. 30, pp. 5-20, April 1988.
3. D. S. Katz, A. Taflove, J. P. Brooks and E. Harrigan, "Large-scale methods in computational electromagnetics," *Cray Channels*, vol. 13, pp. 16-19, Spring 1991.
4. A. Taflove, "Re-inventing electromagnetics: Supercomputing solution of Maxwell's equations via direct time integration on space grids," *Cray Channels*, vol. 15, no. 2, pp. 14-17, Summer 1993.
5. A. Taflove, "Re-inventing electromagnetics: Emerging applications for FDTD computation," *IEEE Computational Science and Engineering*, vol. 2, no. 4, pp. 24-34, Winter 1995.
6. A. Taflove, "Why study electromagnetics: The first unit in an undergraduate electromagnetics course," *IEEE Antennas and Propagation Magazine*, vol. 44, no. 2, pp. 132-139, April 2002.

## KEY FINAL PROJECT REPORTS

1. A. Taflove, *Time Domain Solutions for Electromagnetic Coupling*, Final Report RADC-TR-78-142, Contract F30602-77-C-0163, Rome Air Development Center, Griffiss AFB, NY, June 1978.
2. J. Dabkowski and A. Taflove, *Mutual Design Considerations for Overhead AC Transmission Lines and Gas Transmission Pipelines. Vols. 1 and 2*, Final Report EL-904, Project RP 742-1, Electric Power Research Institute, Palo Alto, CA, Sept. 1978.
3. A. Taflove, *Evaluation of Time-Domain Electromagnetic Coupling Techniques. Vols. 1 and 2*, Final Report RADC-TR-80-251, Contract F30602-79-C-0039, Rome Air Development Center, Griffiss AFB, NY, 1980.

4. A. Taflove and K. R. Umashankar, *Mutual Design of Overhead Transmission Lines and Railroad Communications and Signal Systems. Vols. 1 - 3*, Final Report EL-3301, Project RP 1902-1, Electric Power Research Institute, Palo Alto, CA, Oct. 1983.
5. A. Taflove and K. R. Umashankar, *Analytical Models for Electromagnetic Scattering*, Final Report RADC-TR-85-87, Contract F19628-82-C-0140, Rome Air Development Center, Hanscom AFB, MA, 1985.
6. A. Taflove and K. R. Umashankar, *Advanced Numerical Modeling of Microwave Penetration and Coupling for Complex Structures*, Final Report UCRL-15960, Contract 6599805, Lawrence Livermore National Laboratory, Livermore, CA, 1987.
7. A. Taflove and G. A. Kriegsmann, *Exploration of Advanced Electromagnetic Modeling Concepts*, Final Report to Lockheed Missiles and Space Co., Sunnyvale, CA, Nov. 1987.
8. E. Thiele and A. Taflove, *FDTD Modeling of Vivaldi Flare Antennas*, Final Report to Northrop Defense Systems Division, Rolling Meadows, IL, July 1992.
9. A. Taflove and K. R. Umashankar, *Extension of On-Surface Radiation Condition (OSRC) Theory to Full-Vector Electromagnetic Wave Scattering by Three-Dimensional Conducting, Dielectric, and Coated Targets*, Final Report to Office of Naval Research, ONR Contract No. N00014-88-K-0475, Dec. 1993.
10. S. Barnard and A. Taflove, *Application of Massively Parallel Supercomputing to 3-D RCS Methods and Modeling of Complex Materials*, Final Report to NASA-Ames, Contract No. NAS2-13890, Nov. 1994.
11. A. Taflove, *Electromagnetic Field Analysis of Digital Circuits and Modules for EMC and Reliability*, Final Report to U.S. Air Force Rome Laboratory, Contract F30602-95-C-0073, Feb. 1996.

### **MAJOR COMPUTER SOFTWARE CONTRIBUTIONS**

1. Physics kernel of the Lawrence Livermore National Laboratory FDTD electromagnetic wave interaction software, TSAR (with James C. Stringer), 1985–87.
2. Cray Research FDTD electromagnetic wave interaction software “LC,” capable of detailed modeling of signal integrity within high-speed computer circuit boards and modules.

### **IEEE ANTENNAS AND PROPAGATION SOCIETY NATIONAL LECTURES**

“Where is Engineering Electromagnetics Going?” Twelve two-hour talks presented during Oct. 1990–May 1991 at:

- |  |                                       |
|--|---------------------------------------|
| 1. Grumman Aerospace, Bethpage, NY     | 7. IEEE AP-S Chapter, Santa Clara, CA |
| 2. University of California, Davis, CA | 8. IEEE AP-S Chapter, Atlanta, GA     |
| 3. Arizona State University, Tempe, AZ | 9. IEEE AP-S Chapter, Phoenix, AZ     |
| 4. Los Alamos National Laboratory, NM  | 10. IEEE AP-S Chapter, Chicago, IL    |
| 5. ABB Impell Corp., Lincolnshire, IL  | 11. IEEE AP-S Chapter, Dallas, TX     |
| 6. University of Arizona, Tucson, AZ   | 12. IEEE AP-S Chapter, Boston, MA     |

### **OTHER INVITED TALKS SINCE SEPT. 1989**

- “Computational Electromagnetics,” Lockheed Aeronautical Systems Co., Burbank, CA (9/89)
- “Applications of Supercomputing Computational Electromagnetics,” IIT EECS Dept., Chicago, IL (10/89)
- “Supercomputing Computational Electromagnetics,” DARPA, Arlington, VA (11/89)
- “State of Finite-Difference Time-Domain Computational Solution of Maxwell’s Equations,” *First Los Alamos Symp. on Ultra-Wideband Radar*, Los Alamos National Lab., NM (3/90)
- “State of Supercomputing Computational Electromagnetics for Scattering and Radar Cross Section,” U.S. Dept. of Defense, Crystal City, D.C. (4/90)
- “The Role of Analysis in an Age of Computers: View from the Numerical Side,” *Special Session on the Role of Analysis in an Age of Computers*, IEEE AP-S Int. Symp., Dallas, TX (5/90)
- “Software Validation for FDTD,” *Code Validation Workshop*, IEEE AP-S Int. Symp., Dallas, TX (5/90)
- “Preparation for Careers in Science and Engineering: High School, College, and Graduate School,” Midwest Talent Search, Northwestern Univ. Dept. of Education, Evanston, IL (5/90)

- “From B-2 Bombers to Very High Speed Integrated Circuits and Beyond: Supercomputing Computational Electromagnetics in the 1990’s”
- Cray Research corporate headquarters (to John Rollwagen, CEO), Minneapolis, MN (6/90)
  - New Trier High School, Winnetka, IL (4/93)
  - Evanston Township High School, Evanston, IL (10/93)
  - Second Intl. Conf. and Workshop on Approximations and Numerical Methods for the Solution of Maxwell’s Equations*, Washington, D.C. (10/93)
  - IEEE Mohawk Valley Section Dual-Use Technologies & Applications Conf.*, SUNY Institute of Technology at Utica/Rome, NY (5/94)
- “State of the Art and Future Directions in Finite-Difference and Related Techniques in Supercomputing Computational Electromagnetics,” *Intl. Conf. on Directions in Electromagnetic Wave Modeling*, Polytechnic Univ., New York (10/90)
- “Finite-Difference Time-Domain Solution of Maxwell’s Equations,” *Progress in Electromagnetics Research (PIERS) Symp.*, MIT, Cambridge, MA (7/91)
- “Supercomputing Simulation of Femtosecond Pulse Propagation,” *Superconducting Digital Circuits and Systems Conf.*, George Washington Univ., Washington, DC (9/91)
- “Re-Inventing Electromagnetics: Supercomputing Solution of Maxwell’s Equations via Direct Time Integration on Space Grids”
- AIAA 30th Aerospace Sciences Mtng. (Paper 92-0333), Reno, NV (1/92)
  - Electromagnetics Labs, Univ. of Illinois, Urbana, IL (5/92)
  - National Engineering Consortium *ComForum*, Chicago, IL (6/92)
  - Symp. on Computational Electromagnetics, Computer-Aided Design and Supercomputing*, Central Intelligence Agency, McLean, VA (7/92)
  - Air Force Institute of Technology, WPAFB, OH (9/92)
  - MIT Lincoln Lab, Lexington, MA (10/92)
  - National Engineering Consortium *ComForum*, Chicago, IL (10/92)
  - Symp. on High-Performance Computing in Flight Vehicles*, NASA-Langley, Hampton, VA (12/92)
  - Marquette Univ., Milwaukee, WI (4/93)
- “State of the Art of FDTD Supercomputing Computational Electromagnetics Applications in Electrical Engineering”
- Bell & Howell Corp., Lincolnwood, IL (2/93)
  - Univ. of Rochester, Rochester, NY (4/93)
  - Argonne National Lab., Lemont, IL (5/93)
  - National Security Agency, Fort Meade, MD (5/93)
- “Mathematical Developments in Grid-Based Time-Domain Algorithms for Maxwell’s Equations,” DOD Electromagnetics Code Consortium, Redstone Arsenal, Huntsville, AL (4/92)
- “Overview of Finite-Difference Time-Domain Techniques,” *Radiofrequency Radiation Dosimetry Workshop*, Brooks AFB, TX (12/92)
- Culminating address, “Where Do We Go from Here?” *Conf. on High-Speed Computing*, Lawrence-Livermore and Los Alamos National Labs., Salishan Lodge, OR (3/93)
- “Advances in Finite-Difference Time-Domain Methods for Engineering Electromagnetics”
- Second U. S. National Congress on Computational Mechanics*, Washington, DC (8/93)
  - Second Intl. Conf. on Ultra-Wideband, Short-Pulse Electromagnetics*, Polytechnic University, Brooklyn, NY (4/94)
  - National Institute of Standards and Technology, Boulder, CO (8/94)
  - Wireless Technology Research Corp., Los Angeles, CA (12/94)
  - Motorola, Arlington Heights, IL (12/94)
  - National Radio Science Meeting*, Boulder, CO (1/95)
  - Applied Computational Electromagnetics Society Symp.*, Monterey, CA (3/95)
  - Institute for Computer Applications in Science and Engineering (ICASE), NASA-Langley, Hampton, VA (6/95)

“FDTD Supercomputing Computational Electromagnetics Analysis of High-Speed Microcircuit Modules,” *Government Microcircuit Applications Conf. (GOMAC)*, New Orleans, LA (11/93)

Keynote talk, “A World of Problems Untouched by Existing Tools,” *Conf. on High-Speed Computing*, Lawrence-Livermore and Los Alamos National Labs, Salishan Lodge, OR (4/94)

“Progress in FDTD Modeling of High-Frequency Electronic and Micro-Optical Devices”  
*IEEE Intl. Microwave Theory and Techniques Symp.*, Orlando, FL (5/95)  
*Progress in Electromagnetics Research Symp. (PIERS'95)*, Seattle, WA (6/95)

Plenary talk, “Advances in Finite-Difference Time-Domain Numerical Modeling Technique for Maxwell’s Equations”  
*IEE Intl. Conf. on Antennas and Propagation (ICAP '95)*, Eindhoven, Netherlands (4/95)  
*Conf. Journeees Maxwell II*, Bordeaux, France (6/95)

“FDTD Computational Electromagnetics Modeling of Photonic Wire Microcavity Lasers”  
 Motorola Semiconductor Products Sector, Tempe, AZ (3/96)  
*Workshop on Computational Electromagnetics and its Applications*, Institute for Computer Applications in Science and Engineering (ICASE), NASA-Langley, Newport News, VA (5/96)

“State of Computational Electromagnetics and Parallel Electromagnetics Applications,” *Intl. Conf. on Parallel Processing*, Indian Lakes Resort, Bloomingdale, IL (8/97)

“Advances in FDTD Computational Electrodynamics,” *Progress in Electromagnetics Research Symp. (PIERS'98)*, Nantes, France (7/98)

“Pulsed Confocal Microwave Technology for Early-Stage Breast Cancer Detection,” Northwestern University Robert R. McCormick School of Engineering Advisory Council, Evanston, IL (9/98)

“A Novel Breast Cancer Radar Technology Aimed At Detecting ‘Stealthy’ Tumors,” Annual Tech Corporate Partners Meeting, Northwestern University Robert R. McCormick School of Engineering, Evanston, IL (3/99)

“A Novel Breast Cancer Radar Technology Aimed At Detecting ‘Stealthy’ Tumors,” Spring Retreat of the Northwestern University Lurie Cancer Center, Evanston Hospital, Evanston, IL (3/99)

“FDTD—How Complex a Problem Can We Solve?” Millennium Session, *IEEE Antennas and Propagation Society Intl. Symp.*, Salt Lake City, UT (7/00)

“Finite-Difference Time-Domain Modeling in Engineering Electromagnetics,” Sarnoff Corporation, Princeton, NJ (11/00)

“Synergies that Result in Effective Teaching,” Northwestern University Searle Center for Teaching Excellence, Evanston, IL (1/01)

“Emerging Prospects for FDTD Computational Electromagnetics,” *Intl. Conf. on Electromagnetics in Advanced Applications (ICEAA'01)*, Torino, Italy (9/01)

“Prospects for Finite-Difference Time-Domain (FDTD) Computational Electrodynamics”  
 American Physical Society / Intl. Union of Pure and Applied Physics *Conf. on Computational Physics 2002 (CCP'2002)*, San Diego, CA (8/02)  
 Chicago Joint Chapter, IEEE Antennas and Propagation Society and Microwave Theory and Techniques Society, Evanston, IL (10/02)  
 Motorola University’s worldwide Intranet Immediate Instruction – I<sup>3</sup>, Schaumburg, IL (11/02)  
 Optiwave Corp., Ottawa, Canada (3/04)

“Electrodynamics in War and Peace: From Detecting Stealthy Airplanes to Detecting Stealthy Breast Cancers”  
*Continuing Education Program of the Alumnae of Northwestern University*, Evanston, IL (1/03)  
*Classes Without Quizzes*, Northwestern University, Evanston, IL (10/03)

“Electromagnetic Wave Diffraction Models for Accurate RF Propagation Predictions in Urban Environments,” Motorola University’s worldwide Intranet Immediate Instruction – I<sup>3</sup>, Schaumburg, IL (2/03)

“Why Study (and Teach!) Electromagnetics,” Dept. of Electrical and Computer Engineering, Michigan State University, East Lansing, MI (4/03)

“Two Emerging Multiphysics FDTD Applications from the Megameter Scale at 3 Hz to the Nanometer Scale at 300 THz,” *2003 IEEE Antennas and Propagation Soc. Intl. Symp.*, Columbus, OH (6/03)

“Ultrahigh-Speed Wireless Digital Bus Interconnects Using Electromagnetic Bandgap (EBG) Technology,” Intel Corp. Portland, OR (8/04)

Plenary talk, “A Perspective on the 40-Year History of FDTD Computational Electrodynamics,” *Applied Computational Electromagnetics Society (ACES) 2006 Conference*, Miami, FL (3/06)

Keynote technical talk, “Advances in FDTD Techniques and Applications in Photonics,” *Photonics North 2007 Conference*, Ottawa, Canada (6/07)

## NORTHWESTERN UNIVERSITY ACTIVITIES

Prof. Taflove participated in two interdisciplinary research programs sponsored by the *Institute for Bioengineering and Nanoscience in Advanced Medicine (IBNAM)* of Northwestern University:

- 1) “Novel Rigorous Electromagnetic Field Modeling of Bioelectric Signals Within the Human Body,” with Drs. Todd Kuiken and Julius Dewald, Rehabilitation Institute of Chicago; and Dr. Nikolay Stoykov, Northwestern University Medical School (2002-03).
- 2) “Towards Nanoscale Double Resonance Optical Imaging of Living Cells,” with Prof. Vadim Backman, Dept. of Biomedical Engineering, McCormick School of Engineering (2004-05).

Prof. Taflove has participated in the following Northwestern University and McCormick School of Engineering Committees:

- 1) McCormick School Dean’s Advisory Committee (1987-92)
- 2) McCormick School Promotion and Tenure Committee (1989-94)
- 3) Search Committee, McCormick School Dean (1991-92)
- 4) Northwestern University General Faculty Committee (2004-07)
- 5) Northwestern University Faculty Reappointment, Promotion, Tenure, and Dismissal Appeals Panel (2006-09)

Prof. Taflove has participated in the following EECS Department Committees:

- 1) Chairperson, Graduate Committee (1989-92)
- 2) Chairperson, Promotion and Tenure Committee (1992-94)
- 3) Chairperson, Publicity Committee (1996-99, 2000-04)
- 4) Member, Computing Resources Committee (1999-2000)
- 5) Associate Department Chair and Director, Graduate Committee (2004-05)
- 6) Chairperson, Undergraduate Recruiting Committee (2005-09)

Prof. Taflove was also a long-time participant in Northwestern University Program Review, having served on five Program Review Committees (three as chairperson):

- 1) Chairperson, Review of Chemical Engineering Department (1987);
- 2) Chairperson, Review of Communication Sciences and Disorders Department (1989).
- 3) Co-Chairperson, Review of campus-wide computing and telecommunications (1988).
- 4) Member, Review of Chemistry Department (1994).
- 5) Member, Re-review of Chemical Engineering Department (1995).

Prof. Taflove originated or co-originated the following programs at Northwestern’s McCormick School of Engineering:

- 1) Honors Program in Undergraduate Research (the “B.S./Ph.D program”). This was designed to attract superstar students to McCormick. It combined course enrichment with one-on-one mentorship and financial support by research-active faculty; early admission into the Graduate School’s Ph.D. program with support thereafter by all-expenses fellowships; and substitution of undergraduate research work for the M.S. degree. Prof. Taflove was the faculty advisor for this program from its inception (1989) to 2008.
- 2) Undergraduate Design Competition. Over the years, this annual robotics competition involved many hundreds of McCormick students. Prof. Taflove was the faculty advisor for this program from its inception (1992) to 2007.

- 3) High school outreach to New Trier, Evanston Township, and Niles North (1992-95). Ph.D. students in Prof. Taflove's group taught a formal 10-week after-school course in Fortran and the use of Unix windowing workstations for interested students from the three local high schools.
- 4) Motorola Center for Telecommunications Research. This was a multi-investigator collaborative research center at McCormick funded at approximately \$600K/year.

Prof. Taflove developed the following courses:

- 1) ECE 408-1,2 (First-year graduate course sequence in electromagnetics)
- 2) ECE 386 (Undergraduate/graduate introduction to computational electromagnetics)
- 3) ECE 307 (Undergraduate teaching lab in communications funded by the AT&T Foundation)
- 4) ECE 398 (Senior-year design course option)

Prof. Taflove has been a faculty advisor to the following student activities:

- 1) McCormick School Honors Program in Undergraduate Research (1989-2008).
- 2) Eta Kappa Nu electrical engineering honor society (1990-present)
- 3) Tau Beta Pi engineering honor society (1990-2008)
- 4) McCormick School Undergraduate Design Competition (1991-2007)
- 5) McCormick School Amateur Radio Society, W9BGX (1992-present)
- 6) Northwestern University Undergraduate Research Journal (2003-present)

From 1997 to 2008, Prof. Taflove participated in McCormick's innovative freshman *Engineering First* curriculum, instructing both Engineering Analysis 1 and Engineering Design and Communications.

From 2000-05, Prof. Taflove was the faculty Master of Northwestern's Science and Engineering Residential College (SERC), a thematic residence for undergraduates focusing on science and technology and its relation to our society. In 2003, he helped to guide the transition and expansion of the SERC from century-old Lindgren Hall, which housed 38 students, to the new Slivka Hall, which houses 138 students.

### **SHORT COURSES INSTRUCTED**

1. A. Taflove and K. R. Umashankar, "Mutual Design Seminar: Overhead Transmission Lines/Railroad Communications and Signal Systems," 2 1/2-days, sponsored by Electric Power Research Institute (EPRI), presented twice during 1985-86 at the EPRI offices in Washington, D.C. to a total of about 60 engineers and managers employed by U.S. and Canadian electric power and railroad companies.
2. A. Taflove, G. A. Kriegsmann and K. R. Umashankar, "Advanced Numerical Modeling of Electromagnetic Wave Interactions with Complex, Electrically-Large Structures," 2 1/2-days, presented in March 1986 at Los Angeles, CA to 15 engineers and managers employed by U. S. government agencies and aerospace firms.
3. A. Taflove, "Computational Electromagnetics," 1 day, presented at U. S. Naval Weapons Center, China Lake, CA, Jan. 1990 to 20 engineers and managers.
4. A. Taflove, "Basis and Application of Finite-Difference Time-Domain Techniques for Modeling Electromagnetic Wave Guiding, Radiation and Scattering," 40-hours, presented during Aug. – Oct. 1991 to 12 engineers and managers at Northrop Defense Systems Division, Rolling Meadows, IL.
5. A. Taflove, "Basis and Application of Finite-Difference Time-Domain Techniques for Modeling Electromagnetic Wave Interactions," 1-day, presented to 60 engineers at the 1992 IEEE Antennas and Propagation Society Intl. Symp., Chicago, IL, July 1992.

### **SWORN TESTIMONY BEFORE GOVERNMENT AGENCIES**

1. Testified as an expert witness on behalf of Commonwealth Edison in the case of Sarto v. Commonwealth Edison, Illinois Commerce Commission, March 3, 1992.
2. Testified as an expert witness on behalf of Commonwealth Edison in the case of "Application of Commonwealth Edison Company for a Certificate of Public Convenience and Necessity, under Section 8-406 of the Illinois Public Utilities Act to Construct, Operate, and Maintain a New Electric Transmission Line in Lake County, Illinois," Docket No. 92-0121 before the Illinois Commerce Commission, March 18, 1994.

## **OTHER PROFESSIONAL ACTIVITIES**

1. Co-organizer / co-moderator of two 1-day forums, *Electric and Magnetic Fields: Science and Policy*, sponsored by Commonwealth Edison (11/93 and 10/95). Each forum was attended by about 200 people, including leaders of municipalities and school districts throughout northeastern Illinois.
2. Consultant to the Village of Wilmette, IL (1993) to develop guidelines for the placement of commercial cellular telephone antennas.
3. Consultant to the Village of Wilmette, IL (1994) to collaborate with engineers from Commonwealth Edison to find means to limit the public's exposure to magnetic fields generated by Edison's buried 60-Hz ac power lines.
4. Consultant to the City of Wheaton, IL (1994) on a proposed Commonwealth Edison power line siting.
5. Consultant to the Village of Winnetka, IL (1998, 2000, '03, '05, '08, '09) to evaluate the placement of commercial cellular and personal communications system (PCS) antennas.
6. Consultant (pro bono) to a private citizens group in Kenilworth, IL (1999) to evaluate the placement of a proposed commercial PCS antenna near their homes.
7. Consultant to AT&T Wireless Services (1999-2000) to evaluate the placement of its PCS antennas.
8. Consultant to the City of Park Ridge, IL (2000-06) to evaluate the placement of commercial cellular and PCS antennas and to re-locate the Police Department's primary UHF antenna.
9. Consultant to the City of Highland Park, IL (2001, 2005-06) to evaluate the placement of commercial cellular and PCS antennas.
10. Consultant to VoiceStream Wireless, Inc. (2001) to evaluate the placement of a PCS antenna.
11. Consultant to T-Mobile, Inc. (2003) to evaluate the placement of its PCS antennas.
12. Consultant to Corridor Compatibility Co. (2004) to evaluate potential electric shock hazards associated with the siting of a rail line adjacent to an ac power substation in downtown Reno, NV.
13. Consultant to the Village of Glen Ellyn, IL (2004, '07) to evaluate the placement of a commercial PCS antenna.
14. Consultant to Velocitel, Inc. (2004) to evaluate the placement of a commercial PCS antenna.

## **AMATEUR RADIO LICENSE**

Prof. Taflove has been a licensed amateur radio operator since 1964, continuously holding the call letters WA9JLV. He is the Trustee of W9BGX, the Northwestern University Amateur Radio Society.