

GREGORY J. PARKER

5 Sable Terrace
Latham, NY 12110
518/783 7993
gjp@parker9.com

Objective:

Computational research physicist.

Work History:

- April 2004 to present GENERAL ELECTRIC GLOBAL RESEARCH, Niskayuna, NY, USA
Physicist
Optimization and efficiency of reverse osmosis via analytic and CFD modeling. Microstructure modeling by continuum percolation theory for solid oxide fuel cells to optimize porous bi/tri-phase connectivity, electrical conductivity and molecular diffusion for arbitrary Knudsen number. Created design tool for modeling of gas, liquid and particulate neutralization using porous membranes for personal protection suits. Extended and benchmarked electromagnetic simulations of dielectric/metal photonic crystals via FDTD and KKR methods. Electrochemistry model and design tool for high power NaCl (i.e. Zebra) battery. Field emission model and design tool for carbon nanotubes. Led team to assess feasibility of direct conversion of x-rays using the frequency response of ferroelectric materials. Electromagnetic microwave shield design and FDTD modeling for both consumer and military customers. Lead model/simulation with both internal and external teams including setting priorities, tasks and deliverables. Three patent applications and over 10 invention disclosures.
- Nov. 1999 to July 2003 SEAGATE TECHNOLOGY, Pittsburgh, PA, USA
Research Staff Member/Physicist
Design, analyzed and critiqued current and future write/read technology for magnetic recording in consumer products 4-10 years into the future. Created self-consistent steady-state and dynamic simulations of micro-magnetic structures. Accurately predicted magnetic response and wave propagation in soft magnetic patterned devices. Correctly predicted limiting factors in perpendicular recording medium and alternative designs. Successfully modeled the magnetic, electrical and thermal behavior, including 'stochastic' methods, of various magnetic read sensors. Virgin B(H) modeling of magnetic structures. Over 20 invention disclosures, 11 patents.
- June 1998 to Aug. 1999 LAWRENCE LIVERMORE NATIONAL LABORATORY, Livermore, CA, USA
Physicist
Created self-consistent steady-state and dynamic simulations of micro-magnetic structures. Incorporated curved boundaries in 3D finite differencing algorithm. Successful modeling of submicron patterned materials and media responses.
- Mar. 1997 to present SELF-EMPLOYED

Research Consultant/Contractor

Multiple and varied contracts including LLNL, GE-CRD, AMAT, UC-Berkeley and Seagate Technology, LLC. Created, developed and applied kinetic simulations of vacuum and surface flashover processes. Refined and applied kinetic models of positive column discharges. Created and applied hybrid fluid/kinetic simulation codes for design of plasma switches for LCD addressing and PDP devices. Magnetized electron dynamics in 2D hydrodynamic simulations. 3D Monte Carlo simulations of magnetized CCP processing chambers. Created and applied 2D (axisymmetric) resonance radiation trapping model for positive column application. Extended model to allow for non-uniform absorbing gas density and non-uniform foreign gas collision broadening. Created and applied 3D micromagnetics code for write simulations on recording media, decreasing run time by a factor of four.

- Mar. 1994 to Mar. 1997 LAWRENCE LIVERMORE NATIONAL LABORATORY, Livermore, CA, USA
Postdoctoral Research Assistant
Created kinetic simulations of low pressure- high plasma density plasma reactors. Developed and applied hybrid fluid/kinetic simulation codes to plasma processing tools and flat panel plasma displays. Developed new efficient algorithms for neutral transport and chemistry at low pressure. Applied new approaches for low energy ion implantation into crystalline solids. Developed and applied new kinetic algorithms to simulation of dc positive column. Developed new profiler for deposition/etching and coupled with low pressure neutral transport and chemistry modules. Kinetic algorithms for neutron scattering.
- Jan. 1991 to Feb. 1994 UNIVERSITY OF WISCONSIN, Madison, WI, USA
Research Assistant
Created efficient and more physical plasma simulation code over previous model, decreasing run time by 500%. Successfully simulated helium rf and dc discharges fully self-consistently and kinetically. Developed new and efficient algorithms to describe resonant radiation transport. Matrix techniques to model low pressure neutral transport and ion implantation, kinetically. Modeled thermionic energy converters in cesium.
- Jan. 1984 to Feb. 1989 VILLAGE OF SUSSEX, Sussex, WI, USA
Software Programmer and System Administrator
Designed, documented and implemented integrated software packages to perform general business accounting, payroll, billing and account receivables. Recruited, trained and led programming team. Reduced personnel costs by 50%.

Education:

- Sept. 1989 to Feb. 1994 Ph.D., University of Wisconsin- Madison
Major: Physics Minor: Mathematics
- Aug. 1985 to June 1989 B.S. with Honors, University of Wisconsin- Madison
Majors: Physics and Mathematics
Graduated with Distinction

Security Clearance:

Held DOE L clearance (granted 1994).

Skills:

Expert mathematics/physics background: chemical, dynamical, EM, fluid (CFD), thermodynamics and transport modeling. FORTRAN (F77/95), Pascal, COBOL, BASIC, LISP, C/C++, MPI, LaTeX and HTML. UNIX/Linux, Macintosh, Windows administration. Strong oral and written communication skills.

References:

Available upon request.

Patents:

1. 6,621,664: "Perpendicular recording head having integrated read and write portions"
2. 6,654,209: "Low resistance lead structure for a low resistance magnetic read head"
3. 6,661,620: "Differential CPP sensor"
4. 6,724,583: "Adjustable permanent magnet bias"
5. 6,728,065: "Single pole magnetic recording head for perpendicular magnetic recording"
6. 6,785,092: "White head for high anisotropy media"
7. 6,813,115: "Perpendicular magnetic recording head with improved write field gradient"
8. 6,835,464: "Thin film device with perpendicular exchange"
9. 6,954,331: "Magnetic recording head including spatially-pumped spin wave mode writer"
10. 6,985,339: "Disc drive having electromagnetic biased shieldless CPP reader"
11. 7,099,121: "Perpendicular magnetic recording head having a reduced field under the return pole and minimal eddy current losses"
12. 20090160314: "Emissive structures and systems" (*application*)

Publications:

(only refereed)

1. G.J. Parker, W.N.G. Hitchon and J.E. Lawler, "Accelerated solution of the Boltzmann equation", *J. Comput. Phys.*, **106**, 147 (1993).
2. G.J. Parker, W.N.G. Hitchon and J.E. Lawler, "Kinetic modeling of the alpha to gamma transition in rf discharges", *Phys. of Fluids B*, **5**, 646 (1993).
3. G.J. Parker, W.N.G. Hitchon and J.E. Lawler, "Self-consistent kinetic model of an entire dc discharge", *Phys. Lett. A*, **174**, 308 (1993).
4. W.N.G. Hitchon, G.J. Parker and J.E. Lawler, "Physical and numerical verification of discharge calculations", *IEEE Trans. Plasma Sci.*, **21**, 228 (1993).
5. J.E. Lawler, G.J. Parker and W.N.G. Hitchon, "Radiation trapping simulations using the propagator function method", *J. Quant. Spectros. Radiat. Transfer*, **49**, 627 (1993).
6. G.J. Parker, W.N.G. Hitchon and J.E. Lawler, "Radiation trapping simulations using the propagator function method: complete and partial frequency redistribution", *J. Phys. B*, **26**, 4643, (1993).
7. W.N.G. Hitchon, G.J. Parker and J.E. Lawler, "Accurate models of collisions in glow discharge simulations", *IEEE Trans. Plasma Sci.*, **22**, 267, (1994).
8. G.J. Parker, W.N.G. Hitchon and J.E. Lawler, "Numerical solution of the Boltzmann equation in cylindrical geometry", *Phys. Rev. E*, **50**, 3210, (1994).
9. R.E.P. Harvey, W.N.G. Hitchon and G.J. Parker, "Plasma chemistry at long mean-free-paths", *J.*

- Appl. Phys.*, **75**, 1940, (1994).
10. R.E.P. Harvey, W.N.G. Hitchon and G.J. Parker, "The role of the plasma in the chemistry of low pressure plasma etchers", *IEEE Trans. Plasma Sci.*, **23**, 436 (1995).
 11. G.J. Parker, W.N.G. Hitchon and D.J. Koch, "Transport of sputtered neutral particles", *Phys. Rev. E*, **51**, 3694, (1995).
 12. A.F. Molisch, G.J. Parker, B.P. Oehry, W. Schupita and G. Magerl, "Radiation trapping with partial frequency redistribution: comparison of approximations and exact solutions", *J. Quant. Spectros. Radiat. Transfer*, **53**, 269, (1995).
 13. V.I. Kolobov, G.J. Parker and W.N.G. Hitchon, "Modeling of non-local electron kinetics in a low pressure inductively coupled plasma", *Phys. Rev. E*, **53**, 1110, (1996).
 14. P. Vitello, J.N. Bardsley, G. DiPeso and G.J. Parker, "Modeling an inductively coupled plasma reactor with chlorine chemistry", *IEEE Trans. Plasma Sci.*, **24**, 123, (1996).
 15. G.J. Parker, W.N.G. Hitchon and E.R. Keiter, "Modeling ion transport during ion implantation", *Phys. Rev. E*, **54**, 938, (1996).
 16. J.P. Verboncoeur, G.J. Parker, B.M. Penetrante and W.L. Morgan, "Comparison of collision rates in PIC-MCC, Monte Carlo and Boltzmann codes", *J. Appl. Phys.*, **80**, 1299, (1996).
 17. U. Kortshagen, G.J. Parker and J.E. Lawler, "Comparison of Monte Carlo simulations and nonlocal calculations of the electron distribution in a positive column plasma", *Phys. Rev. E*, **54**, 6746, (1996).
 18. G.J. Parker and W.N.G. Hitchon, "Comparison of Convected Scheme and Monte Carlo simulations of the electron distribution in a positive column plasma", *Jap. J. Appl. Phys.*, **7B**, 4799, (1997).
 19. K.J. Ilcisin, T.S. Buzak and G.J. Parker, "The switching dynamics of the plasma addressed liquid crystal display", *J. Phys. IV France*, **7**, C4-225, (1997).
 20. G.J. Parker and W.N.G. Hitchon, "Convected Scheme simulations of glow discharges", *Electron Kinetics and Applications of Glow Discharges*, ed. U.Kortshagen and L.D.Tsendin (NATO ASI Series: Plenum Press) Series B: Physics **367**, 75, (1998).
 21. M.R. Gibbons, G.J. Parker, C.J. Cerjan and D.W. Hewett, "Finite difference micromagnetic simulation with self-consistent currents and smooth surfaces", *Physica B*, **275**, n1-3, (2000).
 22. G.J. Parker, C.J. Cerjan and D.W. Hewett, "Embedded curve boundary method for micromagnetic simulations", *J. Magn. Magn. Mater.*, **214**, 130, (2000).
 23. G.J. Parker and C.J. Cerjan, "Micromagnetic simulations of submicron cobalt dots", *J. Appl. Phys.*, **87**, 5513, (2000).
 24. J. Van Ek, A. Shukh, E. Murdock, G. Parker and S. Batra, "Micromagnetic perpendicular recording model: Soft magnetic underlayer and skew effect", *J. Magn. Magn. Mater.*, **235**, 408, (2001).
 25. G. Ju, et al., "High frequency dynamics of the soft underlayer in perpendicular recording system", *J. Appl. Phys.*, **91**, 8052, (2002).
 26. T.A. Roscamp, E.D. Boerner and G.J. Parker, "Three-dimensional modeling of perpendicular reading with a soft underlayer", *J. Appl. Phys.*, **91**, 8366, (2002).
 27. M. Covington, T.M. Crawford and G.J. Parker, "Time-resolved measurement of propagating spin waves in ferromagnetic thin films", *Phys. Rev. Lett.*, **89**, 237202, (2002).
 28. T.M. Crawford, M. Covington and G.J. Parker, "Time-domain excitation of quantized magnetostatic spin-wave modes in patterned NiFe thin film ensembles", *Phys. Rev. B*, **67**, 024411, (2003).
 29. Charles Brucker, et al., "Perpendicular media: alloy versus multilayer", *IEEE Trans. on Magnetics*, **39**, 673, (2003).
 30. A. Rebei and G.J. Parker, "Fluctuations and dissipation of coherent magnetization", *Phys. Rev. B*, **67**, 104434, (2003).
 31. A. Rebei, M. Simionato and G.J. Parker, "Correlation functions of the magnetization in thin films", *Phys. Rev. B*, **69**, 134412, (2004).
 32. M. Covington, A. Rebei, G.J. Parker and M.A. Seigler, "Spin momentum transfer in current perpendicular to the plane spin valves", *Appl. Phys. Lett.*, **84**, 3103, (2004).
 33. M. Covington, M. AlHaijDarwish, Y. Ding, A. Rebei, G.J. Parker, N. Gokemeijer and M.A. Seigler,

- "Spin transfer effects in current perpendicular to the plane spin valves", *J. Magn. Magn. Mater.*, **287**, 325, (2005).
34. B. Ramamurthi, G. Parker, V. Midha, J. Ruud and T. Striker, "Performance modeling of solid oxide fuel cells with a mixed conducting cathode", *Electrochemical Society Proceedings*, **PV 2005-07**, 689, (2005).
35. A. Rebei, W.N.G. Hitchon and G.J. Parker, "sd-exchange interaction in a non-homogeneous ferromagnet" *Phys. Rev. B*, **72**, 064408, (2005).
36. W. Scholz, et al., "Fast magnetization switching with circularly polarized fields and short pulses" *IEEE Trans. on Magnetics*, **44**, (2008).

Conferences:

1. *Gaseous Electronics Conference*, 1991, Albuquerque, NM, USA, 1 contributed paper.
2. *27th Intersociety Energy Conversion Engineering Conference*, 1992, San Diego, CA, USA, 1 contributed paper.
3. *Gaseous Electronics Conference*, 1992, Boston, MA, USA, 2 contributed papers.
4. *Gaseous Electronics Conference*, 1993, Montreal, Canada, 4 contributed papers.
5. *Gaseous Electronics Conference*, 1994, Gaithersburg, Maryland, USA, 1 invited, 4 contributed papers.
6. *International Conference on Plasma Science*, 1995, Madison, WI, USA, 1 invited, 4 contributed papers.
7. *Gaseous Electronics Conference*, 1995, Berkeley, CA, USA, 1 invited, 4 contributed papers.
8. *American Physical Society*, 1995, Louisville, KY, USA, 1 contributed paper.
9. *Gaseous Electronics Conference*, 1996, Argonne, Illinois, USA, 1 invited, 4 contributed papers.
10. *International Conference on Plasma Science*, 1997, San Diego, CA, USA, 1 invited paper.
11. *Gaseous Electronics Conference*, 1997, Madison, WI, USA, 1 contributed talk.
12. *Third International Conference on Reactive Plasmas and the Fourteenth Symposium on Plasma Processing*, 1997, Japan, invited talk.
13. *NATO Advanced Research Workshop* devoted to "Electron kinetics and applications of glow discharges", 1997, St. Petersburg, Russia, invited talk.
14. *XXIII International Conference on Phenomena in Ionized Gases*, 1997, Toulouse, France, invited talk.
15. *Gordon Research Conference on Plasma Processing Science*, 1998, Telton School, NH, USA, invited talk.
16. *Gaseous Electronics Conference*, 1998, Maui, HI, USA, 4 contributed papers.
17. *Hysteresis Modeling and Micromagnetics*, 1999, Perugia, Italy, 1 contributed paper.
18. *Magnetics and Magnetic Materials*, 1999, San Jose, CA, USA, 1 contributed paper.
19. *International Conference on Plasma Science*, 2000, New Orleans, LA, USA, 1 contributed paper.
20. *Magnetics and Magnetic Materials/Intermag*, 2001, San Antonio, TX, USA, 3 contributed papers.
21. *Magnetics and Magnetic Materials*, 2001, Seattle, WA, USA, 4 contributed papers.
22. *Magnetics and Magnetic Materials*, 2002, Tampa, FL, USA, 1 invited, 3 contributed papers.
23. *The XVIII International Colloquium on Magnetic Films and Surfaces*, 2003, Madrid, Spain, 1 contributed paper.
24. *Ninth International Symposium on Solid Oxide Fuel Cells, 207th Meeting of The Electrochemistry Society*, 2005, Quebec City, Canada, 1 contributed paper.
25. *Magnetics Conference/Intermag 2006*, San Diego, CA, USA, 1 contributed paper.