

Curriculum Vitae

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Education

- Ph.D. (Mathematics), New York University, New York, NY, 1979.
- M.S. (Mathematics), New York University, New York, NY, 1977.
- B.A. (Chemical Physics, Mathematical Sciences, Mathematics), Rice University, Houston, TX, 1975.

Professional Experience

- Mathematical and Computational Sciences Division, Information Technology Laboratory, National Institute of Standards and Technology (formerly National Bureau of Standards), Gaithersburg, MD: NIST Fellow, 5/04 – present; Leader, Mathematical Modeling Group, 10/99 – present; Mathematician, 1/82 - 10/99.
- Courant Institute of Mathematical Sciences, New York University: Associate Research Scientist – Research Scientist, 6/79 – 1/82; Research Assistant – Assistant Research Scientist, 8/75 – 6/79.

Visiting Positions

- Courant Institute of Mathematical Sciences, New York University, 1/06–Present.
- Laboratory of Molecular Pharmacology, National Cancer Institute, NIH, 9/05–Present.
- Honorary Senior Research Fellow, School of Mathematics, University of Bristol, UK, 1993 - 1996.
- Institute for Mathematics and its Applications, University of Minnesota; 9/90 - 1/91.
- Institute for Theoretical Physics, University of California at Santa Barbara; 8/85 - 12/85.
- Thomas. J. Watson Industrial Intern Program, Thomas J. Watson IBM Research Center, Yorktown Heights, NY; 6/77 - 8/77.

Research Interests

- Hydrodynamic stability, crystal growth
- Numerical analysis, scientific computing
- Numerical solution of partial differential equations

Professional Activities

- 1991 - 2005, Associate editor, SIAM Journal on Applied Mathematics
- 1994 - 2002, Associate editor, Journal of Computational Physics
- 1998 - Present, Associate editor, Interfaces and Free Boundaries
- 2001 - Present, Associate editor, Journal of Crystal Growth
- Member of American Physical Society, Society for Industrial and Applied Mathematics, Sigma Xi.

Research Collaboration/Supervision

Advisor for NIH Postdoctoral Fellowship Program

- Sohyoung Kim, Laboratory of Molecular Pharmacology, National Cancer Institute, 5/05 - Present.

Advisor for NRC Postdoctoral Research Associateship Program

- David L. Cotrell, 9/03 - 9/05. Currently Institute for Scientific Computing Research, Lawrence Livermore National Laboratory.
- Katharyn F. Gurski, 2/01 - 1/03. Currently Department of Mathematics, George Washington University.
- Daniel M. Anderson, 1/95 - 12/96. Currently Department of Mathematical Sciences, George Mason University.
- Richard J. Braun, 10/91 - 9/93. Currently Department of Mathematical Sciences, University of Delaware.
- Bruce T. Murray, 10/88 - 9/90. Currently Department of Mechanical Engineering, SUNY Binghamton.
- Lucien N. Brush, 1/87 - 12/89. Currently Department of Materials Science and Engineering, University of Washington.

Honors

- NIST Fellow, 2004.
- APS Fellow, Division of Fluid Dynamics, 2001.
- Gold Medal Award for Superior Federal Service, U.S. Department of Commerce, 1991.
- Arthur S. Flemming Award for federal service, Washington D.C. Junior Chamber of Commerce, 1989.
- Silver Medal Award for Superior Federal Service, U.S. Department of Commerce, 1984.
- NSF Mathematical Sciences Postdoctoral Research Fellow; 1979 - 1980.
- NSF Graduate Fellow; 1976 - 1979.
- Undergraduate awards (Rice University): Arthur B. Cohn Scholar (1972), Mary Parker Gieseke Scholar (1973), James and Alice Graham Baker Scholar (1974); Phi Beta Kappa (1974) and Sigma Pi Sigma (1975).

Publications

Books Edited

1. *On the Evolution of Phase Boundaries*, The IMA Series in Mathematics and Its Applications, Vol. 43, M.E. Gurtin and **G.B. McFadden**, eds., (Springer-Verlag, New York, 1992).
2. *Interfaces for the 21st Century: New Research Directions in Fluid Mechanics and Materials Science*, eds. Marc K. Smith, Michael J. Miksis, **G.B. McFadden**, G. Paul Neitzel, David R. Canright, (Imperial College Press, London, 2002).

Book Chapters

1. S.R. Coriell, **G.B. McFadden**, and R.F. Sekerka, Cellular growth during directional solidification, *Annual Review of Materials Science* 15, 1985, pp. 119-145.
2. M.E. Glicksman, S.R. Coriell, and **G.B. McFadden**, Interaction of flows with the crystal-melt interface, *Annual Review of Fluid Mechanics* 18, 1986, pp. 307-335.
3. S.R. Coriell and **G.B. McFadden**, Morphological Stability, in *Handbook of Crystal Growth*, Vol. 1B, ed. D. T. J. Hurle, (Elsevier, Amsterdam, 1993), pp. 785-857.
4. D. M. Anderson, **G.B. McFadden**, and A.A. Wheeler, Diffuse-interface methods in fluid mechanics, *Annual Review of Fluid Mechanics* 30 (1998) 139–165.
5. **G.B. McFadden**, Phase-field models of solidification, in Contemporary Mathematics, Vol. 306, *Recent Advances in Numerical Methods for Partial Differential Equations and Applications*, ed. X. Feng and T.P. Schulze, (American Mathematical Society, Providence, RI, 2002), pp. 107–145.

Recent Articles

1. S.R. Coriell, **G.B. McFadden**, W.F. Mitchell, B.T. Murray, J.B. Andrews, and Y. Arikawa, Effect of flow due to density change on eutectic growth, *Journal of Crystal Growth* 224 (2001) 145-154.
2. S. Van Vaerenbergh, S.R. Coriell, and **G.B. McFadden**, Morphological Stability of a binary alloy: thermodiffusion and temperature-dependent diffusivity, *Journal of Crystal Growth*, 223 (2001) 565–573.
3. J.J. Eggleston, **G.B. McFadden**, and P.W. Voorhees, A phase-field model for highly anisotropic interfacial energy, *Physica D* 150 (2001) 91–103.
4. D.M. Anderson, **G.B. McFadden**, and A.A. Wheeler, A phase-field model with convection: sharp-interface asymptotics, *Physica D* 151 (2001) 305-331.
5. R.F. Sekerka, S.R. Coriell, and **G.B. McFadden**, Separation of scales for growth of an alloy needle crystal, *Metallurgical and Materials Transactions* 32A (2001) 2669-2670.
6. S.R. Coriell and **G.B. McFadden**, Applications of morphological stability theory, *Journal of Crystal Growth* 237-239 (2002) 8–13.
7. **G.B. McFadden** and A.A. Wheeler, On the Gibbs adsorption equation for diffuse interface models, *Proceedings of the Royal Society A* 458 (2002) 1129–1149.

8. G.B. Tanoglu, R.J. Braun, J.W. Cahn, and **G.B. McFadden**, A1–L1₀ phase boundaries and anisotropy via multiple-order-parameter theory for an FCC alloy, *Interfaces and Free Boundaries* 5 (2003) 275–299.
9. **G.B. McFadden**, S.R. Coriell, T.P. Moffat, D. Josell, D. Wheeler, W. Schwarzacher, J. Mallett, A mechanism for brightening: Linear stability analysis of the curvature enhanced coverage model, *Journal of the Electrochemical Society* 150 (2003) C591–C599.
10. K.F. Gurski and **G.B. McFadden**, The effect of surface tension anisotropy on the Rayleigh instability, *Proceedings of the Royal Society A* 459 (2003) 2575–2598.
11. J.E. Guyer, W.J. Boettinger, J.A. Warren, and **G.B. McFadden**, Phase-field modeling of electrochemistry: Equilibrium, *Physical Review B* 69 (2004) 021603.
12. J.E. Guyer, W.J. Boettinger, J.A. Warren, and **G.B. McFadden**, Phase-field modeling of electrochemistry: Kinetics, *Physical Review B* 69 (2004) 021604.
13. D. Wheeler, T.P. Moffat, **G.B. McFadden**, S.R. Coriell, D. Josell, Influence of a catalytic surfactant on roughness evolution during film growth, *Journal of the Electrochemical Society* 151 (2004) C538–C544.
14. W.J. Boettinger, **G.B. McFadden**, S.R. Coriell, R.F. Sekerka, J.A. Warren, Lateral deformation of diffusion couples, *Acta Materialia* 53 (2005) 1995–2008.
15. M.E. Ali and **G.B. McFadden**, Linear stability of cylindrical Couette flow in the convection regime, *Physics of Fluids* 17 (2005) 054112.
16. D.L. Cotrell and **G.B. McFadden**, Linear stability of spiral poiseuille flow with a radial temperature gradient: centrifugal buoyancy effects, *Physics of Fluids* 17 (2005) 114102.
17. K.F. Gurski, **G.B. McFadden**, and M.J. Miksis, The effect of contact lines on the Rayleigh instability with anisotropic surface energy, *SIAM Journal on Applied Mathematics* 66 (2006) 1163–1187.
18. D.L. Cotrell and **G.B. McFadden**, Axial flow effects on the stability of circular Couette flow with viscous heating, *Physics of Fluids* 18 (2006) 084106.
19. J. Slutsker, K. Thornton, A.L. Roytburd, J.A. Warren, **G.B. McFadden**, Phase field modeling of solidification under stress, *Phys. Rev. B* 74 (2006) 014103.
20. J.A. Dantzig, W.J. Boettinger, J.A. Warren, **G.B. McFadden**, S.R. Coriell, and R.F. Sekerka, Numerical modeling of diffusion-induced deformation, *Metallurgical Transactions A* 37 (2006) 2701–2714.
21. D.M. Anderson, P. Cermelli, E. Fried, M.E. Gurtin, and **G.B. McFadden**, General dynamical sharp-interface conditions for two-phase viscous heat-conducting fluids, *Journal of Fluid Mechanics* 581 (2007) 323–370.
22. **G.B. McFadden**, S.R. Coriell, K.F. Gurski, and D.L. Cotrell, Onset of convection in two liquid layers with phase change, *Physics of Fluids* 19 (2007) 104109.
23. W.J. Boettinger, J.E. Guyer, C.E. Campbell, and **G.B. McFadden**, Computation of the Kirkendall velocity and displacement fields in a one-dimensional binary diffusion couple with a moving interface, *Proceedings of the Royal Society A* 463 (2007) 3347–3373.
24. **G.B. McFadden**, S.R. Coriell, K.F. Gurski, and D.L. Cotrell, Convective instabilities in two liquid layers, *Journal of Research of the National Institute of Standards and Technology* 112 (2007) 271–281.