

Curriculum Vitae

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Gregory R. Baker,
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Date of Birth: November 9, 1947.
Place of Birth: Johannesburg, Rep. South Africa.
Citizenship: U.S.A.

Education

Ph. D. (Applied Mathematics), 1977, California Inst. of Tech., Pasadena, CA

Thesis Topic: Studies in Vortex Motion

Thesis Advisor: Philip Saffman

M. S. Cum Laude, (Physics), 1973*

B. S. (Honors), (Physics), 1970*

B. S. (Applied Mathematics, Physics), 1969*

*University of Natal, Durban, Rep. South Africa.

Honors

Presidential Young Investigator, NSF Award for 5 yrs., 1984-9.

I am one of three selected in Mathematical Sciences in the first year of the program, 1984.

Work Experience

8/1/88 to date	Eminent Scholar in Scientific Computation and Numerical Analysis, Department of Mathematics, The Ohio State University, Columbus, Ohio.
7/1/86 to 7/31/88	Research Mathematician, CRSL, Exxon Research and Eng. Co., Annandale, New Jersey.
7/1/86 to 7/31/88	Visiting Fellow, Dept. Mechanical and Aerospace Engineering, Princeton University.
9/1/85 to 7/1/86	Director of Applied Mathematics Program*
8/1/81 to 7/1/86	Associate Professor*
7/1/80 to 7/30/81	Assistant Professor**
10/1/79 to 6/30/80	Lecturer**
7/1/77 to 8/31/79	Instructor**
10/1/76 to 6/30/77	Research Fellow in Department of Applied Mathematics, Calif. Inst. of Tech., CA.

*Department of Mathematics, University of Arizona.

**Massachusetts Institute of Technology.

Publications (Refereed)

1. G. R. Baker, S. J. Barker, K. K. Bofah and P. G. Saffman, Laser Anemometer Measurements of Trailing Vortices in Water, *J. Fluid Mech.* (1974) 65, p. 325.
2. G. R. Baker, P. G. Saffman and J. S. Sheffield, Structure of a Linear Array of Hollow Vortices of Finite Cross-Section, *J. Fluid Mech.* (1976), 74, p. 469.
3. G. R. Baker, The "Cloud-in-Cell" Technique Applied to the Roll Up of Vortex Sheets, *J. Comp. Phys.* (1979), 31, p.76.
4. P. G. Saffman and G. R. Baker, Vortex Interactions, *Annual Review of Fluid Mech.* (1979), 11, p. 95.
5. G. R. Baker, Energetics of a Linear Array of Hollow Vortices of Finite Cross-Section, *J. Fluid Mech.* (1980), 99, p.97.
6. G. R. Baker, A Test of the Method of Fink and Soh for Following Vortex Sheet Motion, *J. Fluid Mech.* (1980), 100, p. 209.
7. G. R. Baker, D. I. Meiron and S. A. Orszag, Vortex Simulations of the Rayleigh-Taylor Instability, *Phys. Fluids* (1980),23, p. 1485.
8. G. R. Baker and M. I. Israeli, Spin-up from rest of Immiscible Fluids, *Studies in Appl. Math.* (1981), 65, p. 249.
9. D. I. Meiron, G. R. Baker and S. A. Orszag, Analytic Structure of Vortex Sheet Dynamics. I: Kelvin-Helmholtz Instability, *J Fluid Mech.* (1982), 114, p. 283.
10. G. R. Baker and S. Mardeusz, The Steady Viscous Flow of Two Differentially Rotating Immiscible Fluids, *Studies in Appl. Math.* (1982), 67, p. 63.
11. G. R. Baker, D. I. Meiron and S. A. Orszag, Generalized Vortex Methods for Free Surface Flow Problems, *J Fluid Mech.* (1982), 123, p. 477.
12. C. P. Verdon, R. L. McCrory, R. L. Morse, G. R. Baker, D. I. Meiron and S. A. Orszag, Nonlinear Effects of Multi-Frequency Hydrodynamic Instabilities on Ablating Accelerating Thin Shells, *Phys. Fluids* (1982), 25, p.1653.
13. G. R. Baker, D. I. Meiron and S. A. Orszag, Boundary Integral Methods for Axisymmetric and Three-Dimensional Rayleigh-Taylor Instability Problems, *Physica D* (1984), 12, p. 19.
14. G. R. Baker and M. J. Shelley, Boundary Integral Techniques for Multi-Connected Domains, *J. Comp. Phys.* (1986), 64, p. 112.
15. G. R. Baker, R. L. McCrory, C. P. Verdon and S. A. Orszag, Rayleigh-Taylor Instability of Fluid Layers, *J Fluid Mech.* (1987), 178, p. 161.

16. M. J. Shelley and G. R. Baker, Order Preserving Approximations to Successive Derivatives of Periodic Functions by Iterated Splines, *SIAM J. Num. Anal.* (1988), 25, p. 1442.
17. G. R. Baker and D. W. Moore, The Rise and Distortion of a Two-Dimensional Gas Bubble in an Inviscid Liquid, *Phys. Fluids* (1989), A1, p. 1451.
18. G. R. Baker and M. J. Shelley, On the Connection between Thin Vortex Layers and Vortex Sheets, *J. Fluid Mech.* (1990), 215, p. 161.
19. G. R. Baker, D. J. Meiron and S. A. Orszag, Generalized Vortex Methods for Free Surface Flow Problems II: Radiating Waves, *J. Sci. Computing* (1990), 4, p. 237.
20. G.R. Baker, A Study of the Numerical Stability of the Method of Contour Dynamics, *Phil. Trans. R. Soc. Lond.* (1990), A333, p. 391.
21. G.R. Baker, R.E. Caffisch, and M. Siegel, Singularity formation during Rayleigh-Taylor instability, *J. Fluid Mech.* (1993), 252, p.51.
22. J. Ely and G.R. Baker, High precision calculations of vortex sheet motion, *J. Comput. Phys.* (1994), 111, p.275.
23. G. R. Baker, M. Siegel, and S. Tanveer, A well-posed numerical method to track isolated conformal map singularities in Hele-Shaw flow, *J. Comput. Phys.* (1995), 120, p.348.
24. G.R. Baker, X. Li, and A. Morlet, Analytic Structure of Two 1D-Transport Equations with Non Local Fluxes, *Physica D* (1996), 91, p.349.
25. G. Baker and A. Nachbin, Stable methods for vortex sheet motion in the presence of surface tension, *SIAM J. Sci. Comp.* (1998), 19, p. 1737-1766.
26. G. Baker and Q. Nie, The asymptotic motion of an accelerating, thick layer of inviscid liquid, *Phys. Fluids* (1998), 10, p.101-112.
27. G. Baker and Q. Nie, Application of adaptive quadrature to axi-symmetric vortex sheet motion, *J. Comp. Phys.* (1998), 143, p.49-69.
28. S.J. Cowley, G.R. Baker, and S. Tanveer, On the formation of a Moore singularity, *J. Fluid Mech.* (1999), 378, p.233-267.

Conference Proceedings

- P. Krumm, M. Hellberg and G. Baker, in *Proceedings of the 3rd Intern. Conf. on Quiescent Plasmas*, Elsinore, (Danish Atomic Energy Comm.) (1971), p. 9.
- G. R. Baker and M. I. Israeli, Deformations of a Drop Caused by Variable Surface Tension, in *Proc. of the 7th Intern. Conf. on Num. Methods in Fluid Mechanics* (1981).
- G. R. Baker, D. I. Meiron and S. A. Orszag, Applications of a Generalised Vortex Method to Nonlinear Free Surface Flows, in the *Proc. of the Conf. on Num. Ship Hydrodynamics*, Paris, (1981).

- G. R. Baker, Generalised Vortex Methods for Free Surface Flows, in *Waves on Fluid Interfaces*, MRC, Wisconsin, (1983).
- G. R. Baker, Generalised Vortex Methods for Stratified, Layered Flows, in *Proc. of the 11th IMACS World Congress*, Oslo, (1986).
- G. R. Baker, Two-Frequency Rayleigh-Taylor and Richtmyer-Meshkov instabilities, in *Proc. IMA Workshop on Computational Fluid Dynamics and Reacting Gas Flows*, Univ. Minnesota, (1986).
- M. J. Shelley and G. R. Baker, The relation between thin vortex layers and vortex sheets, in *Mathematical Aspects of Vortex Dynamics*, (ed. R. Caflisch), SIAM, (1989).
- G. R. Baker, Singularities in the complex physical plane, in *Proc. 3rd Intern. Conf. on Hyperbolic Systems*, Uppsala, (1990).
- G.R. Baker and S. Tanveer, Well-posed numerical calculations for free-surface flows, in *Singularities in Fluids, Plasmas and Optics*, (ed. R. Caflisch), NATO ASI Series, (1993), p.1.
- Gregory Baker, Michael Siegel, and Saleh Tanveer, Singularities and Interfacial Patterns in Hele-Shaw flows, to appear in *Proc. 5th. Intern. Conf. Hyperbolic Systems*, Stonybrook, USA.
- G.R. Baker, On the origin of singularities in vortex sheet motion, AIAA paper 95-2235, presented at the *26th. AIAA Fluid Dynamics Conference*, San Diego, California, 1995.
- K. Essenhigh, T. Aldemir, and G. Baker, Stability Analysis of a Perfectly Stirred Reactor, in *Proc. International Symposium of the American Flame Research Committee*, Monterey, California, 1995.
- G. R. Baker, The asymptotic motion of a tall column of liquid in a tube, in *Proc. 22nd Symp. Numer. Math.*, SANUM, Cape Town, (1998).

National Committee Membership.

1. Member NSF Review Panel - SBIR, Washington D.C., Jan. 1999.
2. Member NSF Review Panel on Fluid Mechanics, Washington D.C., Jan. 1998.
3. Member NSF Review Panel on Fluid Mechanics, Washington D.C., Jan. 1997.
4. Member NSF-SBIR Panel, Washington D.C., Sept. 1993.
5. Member DOE-Applied Mathematics Review Panel, Washington D.C., 1993.
6. NSF-PYI Workshop on Science and Math. Education, Washington,D.C., Nov.1990.
7. Army Basic Research Committee, 1987, National Research Council.
8. Chairman of Organising Committee for SIAM Summer Workshop on "Simulations in Fluid Flow", July, 1985, Arcata, California.

Research Grants.

1. Co-Principal Investigator, NASA, Crystal Growth and Fluid Mechanics Problems in Directional Solidification (Continuation), \$440K, 1996-2000.
2. Co-Principal Investigator, NASA, Crystal Growth and Fluid Mechanics Problems in Directional Solidification, \$210K, 1993-1996.
3. Principal Investigator, NSF, Well-posed Numerical Calculations of Free-Surface Flows, \$32.5K, 1993-1994.
4. Principal Investigator, NSF, Physical Regularizations of the Motion of Vortex Sheets, \$100K, 1990/92.
5. Co-Principal Investigator, NSF, Viscous Regularization of Vortex Sheets, \$20K, 1989/90.
6. Presidential Young Investigator, Topics in Vortex Dynamics, \$0.5M, 1984-9.
7. Co-Principal Investigator, AFSOR, Transition to Complicated Behavior in Infinite Dimensional, Dynamical Systems, \$1.7M ,1986-9.
8. Principal Invetigator, NSF, Stratified Contour Dynamics, \$34.5K, 1983-5.
9. Co-Principal Investigator, DOD, Equipment Grant, \$135K,1984-5.
10. Co-Principal Investigator, SRC, Efficient Methods for Simulating MOS-Integrated Circuits, \$94K, 1984-5.