

ROBERT L. SACHS – Curriculum Vitae

Education

Ph.D., Mathematics, 1980 Courant Institute (New York University)

Advisor: Jürgen K. Moser

B.A. scl, Applied Mathematics, 1976, Harvard University

Academic Positions Held

Professor of Mathematics, George Mason University, 1997 – present

Chair, Department of Mathematical Sciences, GMU, 1996 – 2004

Associate Professor of Mathematics, George Mason University, 1989 – 1996

Asst. Professor of Mathematics, The Pennsylvania State University, 1983 – 1989

Van Vleck Visiting Asst. Prof. of Mathematics, Univ. of Wisconsin, Madison, 1981 – 1983

American Mathematical Society Postdoctoral Fellow, UW, Madison, 1980 – 1981

Awards and Honors

American Mathematical Society Postdoctoral Research Fellowship

National Merit Scholarship, John Harvard Scholarship, *Phi Beta Kappa*

Research Grants

NSF 1990-1992, Studies in Nonlinear Dispersive Waves

NSF 1993-1996, Stability and Instability of Solitary Waves and Multi-Solitons

Other Grants

NSF SCREMS for Server and X-terminals

NSF GK-12 Fellows Grant, Co-PI (5 yrs., \$3M supporting graduate students)

Member of Various Doctoral Committees at Penn State and GMU
Mathematics, Meteorology, Physics, CSI, ITE

Liaison to Program in Higher Education, advising some students

Publications

1. Completeness of derivatives of squared Schrödinger eigenfunctions and explicit solutions of the linearized KdV equation, *SIAM Journal of Mathematical Analysis* **14**, 1983, pp. 674-683.
2. A justification of the KdV approximation to first order in the case of N-soliton water waves in a canal. *SIAM Journal of Mathematical Analysis* **15**, 1984, pp. 468-489.
3. Classical solutions of the KdV equation for non-smooth initial data via inverse scattering. *Communications in Partial Differential Equations* **10**, 1985, pp 29-98.
4. Another identity among squares of eigenfunctions. *Journal of Mathematical Physics* **27**, 1986, p. 471.
5. On a class of eigenfunction identities for Hill operators. *Journal of Mathematical Physics* **29**, 1988, p. 1969-1971.
6. On the preservation of constraints in pole expansions for integrable partial differential equations. *Physics Letters A* **125**, 1987, pp. 111-114.
7. On the integrable variant of the Boussinesq system: Painleve property, rational solutions, a related many-body system and equivalence with the AKNS hierarchy, *Physica D* **30**, 1988, pp. 1-27.
8. Polynomial tau-functions for the AKNS hierarchy. *Proceedings of the AMS 1987 Summer Research Institute on Theta Functions. Proceedings of Symposia in Pure Mathematics* **Vol. 49**, Part 1, 1989, pp. 133-141.
9. Stability and instability of solitary waves for Boussinesq-type systems. *Proceedings of the International Conference on Solitons, Instabilities, and Chaotic Processes in Fluid Mechanics*, 1987, (with J.L. Bona).
10. Global existence of smooth solutions and stability of solitary waves for a generalized Boussinesq equation, *Comm. Math. Phys.* **188**, 1988, pp. 15-29, (with J.L. Bona).
11. Review of "Inverse Spectral Theory", *Bulletin of the AMS* **19**, 1988, pp. 362-366.
12. Bifurcation for semi-linear elliptic problems on an infinite strip via the Nash-Moser technique. *Analysis, etc*, 1990, P. Rabinowitz and E. Zehnder, eds., Academic Press, pp. 563-572.
13. The existence of internal solitary waves in a two-fluid system near the KdV limit. *Geophysical and Astrophysical Fluid Dynamics* **48**, 1989, pp. 25-51 (with J.L. Bona).
14. Review of "Inverse Scattering on the Line", *Bulletin of the AMS* **22**, 1990, pp. 349-351.

15. On the blow-up of certain solutions of the “good” Boussinesq equation. *Applicable Analysis* **34**, 1990, pp. 145-152.
16. On the existence of solitary waves with strong surface tension. *Journal of Differential Equations* **90**, 1991, pp. 31-51.
17. On the stability of KdV Multi-Solitons. *Comm. Pure and Applied Math.* **46**, 1993, pp. 867-901 (with J.H. Maddocks).
18. Constrained Variational Principles and Stability in Hamiltonian Systems, in *Hamiltonian Dynamical Systems*, 1995, H.S. Dumas, K.R. Meyer, and D.S. Schmidt, eds., Springer-Verlag, pp. 231-264 (with J.H. Maddocks).
19. Linear instability of solitary waves of a Boussinesq-type equation: a computer assisted computation, *Nonlinear World* **2**, 1995, pp. 471-507.
20. On the transverse instability of solitary waves in the Kadomtsev-Petviashvili equation, *Physics Letters A* **226**, 1997, pp. 187-192 (with J.C. Alexander and R.L. Pego).

Summary of Accomplishments as Mathematics Department Chair

Hiring and development of outstanding faculty

Creation of Mathematics Doctoral Program

Growth in Major and Overall Enrolment

Budget and Software Management

Improved Placement Program

Redesign of Honors Math courses

Redesign of General Education Math Course (with sciences)

Support for Research

Other Major Service at GMU

Member of Committee that created Computational Science Institute, Fall 1989-Spring 1991, chaired by F. Rossini

Member CSI Council, Jan. 1994-1999

Member SITE Initiative Committee, Jan. 1994-1996, chaired by P. Denning and then S. Nash, A. Manitius, looking at major reform of undergraduate program in SITE

Chair, Senate Ad Hoc Committee on General Education, 1999-2000. Major effort on changing general education program. Continued on committee in 2000-2001

Member and Temporary Chair, GMU Team on Advising, AAHE meeting, 2000-2001
Local Arrangements Committee, International Math Olympiad 2001 (held at GMU)
Member, Honors Program in General Education Executive Council
Member, Ad Hoc Committee to create BS in IT program
Member, Search Committee for Dean of SCS, chaired by S. Nash
Member, President's Task Force on Library, 2004-2005, co-chairs G. Galuzzo, J. Zenelis; Met to create Library component of 2010 Plan
Chaired Ad Hoc Committee on Merger and Integration, College of Science 2005.
Member-at-Large, College of Science Executive Council, 2005-2008.
College of Science, one of Project Shepherds for ST 2 Building Project (ongoing).

Other Service

Numerous search committees: CAS Assoc. Dean, Finance; Assoc. Provosts (General Education, International Programs); Chair, Physics; Chair, Math
Numerous admissions recruiting events both for COS and for Honors
Assorted journal refereeing
Assorted proposal evaluation (NSF, some with Israel, France, College of Science Teaching Innovation)
Outside organization judging, Fairfax County Science Fair and judging for Fairfax High School Science Fair
Work with GMU Math Education on successful NSF grant on MSP Research
Member, Advisory Committee of the Newton Mathematics Competition 2006
Work with GMU Math and CDS on successful NSF grant on Undergraduate Research in Computational Mathematics
College and University Liaison and Member of Executive Committee, NVCTM (K-12 Mathematics), 2007, 2008
GMU Internal Review of Graduate Programs for SEOR
Member of Executive Council, MD-DC-VA Section of Mathematical Association of America (Undergraduate Mathematics), 2009-present

Teaching

Numerous courses taught: Mathematics (undergrad and graduate), Honors Program.

Special teaching of advanced students at Thomas Jefferson HS for Science and Technology

Active in creating Honors calculus courses and in teaching them

Created several Math courses at GMU and Penn State and enhanced several others.

Designed several of initial math courses for CSI program.

Participant in Math and Science Teaching Group with D. Sterling, GSE

Writing a calculus textbook that seeks to address major conceptual issues and employ computer technology effectively

Created cohort program on teaching of multivariable mathematics in conjunction with Fairfax County Schools

Consulted on Summer Program with Loudoun County Schools

Designed and taught two-week enrichment courses for middle school math students

Co-Organizer of Fairfax Math Circle, enrichment program for local pre-college students

Co-Organizer of Northern Virginia Math Teachers Circle, under development

Presenter at various meetings on teaching of calculus