

## Curriculum Vitae of Harvey Segur

Feb. 9, 2016

### BIOGRAPHICAL DATA

Birth date: September 12, 1942  
Birthplace: Oak Park, Illinois  
Citizenship: U.S.A.

### PROFESSIONAL EXPERIENCE

1989-present Professor of Applied Mathematics  
University of Colorado  
Boulder, CO

2000-2003 Chairman, Department of Applied Mathematics  
University of Colorado  
Boulder, CO

1987-1989 Professor of Mathematics  
State University of New York  
Buffalo, NY

1976-1987 Senior Consultant  
Aeronautical Research Associates of Princeton  
Princeton, NJ

1984-1985 Co-director, Program on Integrable Models  
Institute for Theoretical Physics  
University of California at Santa Barbara  
Santa Barbara, CA

1971-1976 Assistant/Associate Professor of Mathematics  
Clarkson College of Technology  
Potsdam, NY

1969-1971 Research Fellow in Applied Mathematics  
California Institute of Technology  
Pasadena, CA

1964-1965 Thermodynamics Engineer  
General Dynamics/Convair  
San Diego, CA

### EDUCATION

1969 Ph.D. in Aeronautical Sciences  
University of California, Berkeley

1967 M.S. in Aeronautical Sciences  
University of California, Berkeley

1964 B.S. with High Honors, Mechanical Engineering  
Michigan State University

## AWARDS

### TEACHING

- 1994 Teaching Excellence Award  
presented by the Boulder Faculty Assembly,  
University of Colorado
- 1995 Faculty Award  
presented by the Minority Engineering Program  
University of Colorado
- 1998 CU President's Teaching Scholar  
presented by John Buechner, President  
University of Colorado

### RESEARCH

- 2004 Distinguished Research Lectureship  
presented by the Council on Research and Creative Work  
University of Colorado

### TEACHING AND RESEARCH

- 2011 Hazel Barnes Prize  
the highest faculty recognition for teaching and research  
awarded by the University of Colorado at Boulder

## PRINCIPAL LECTURER

International Workshop on Tsunami and Nonlinear Waves (3 lectures), Calcutta, India, March 6-10, 2006

SIAM Workshop on Stability (4 lectures), U of Washington, Seattle, Sept. 6-8, 2006

NSF/CBMS Regional Conference on "Water Waves: Theory and Experiment" (10 lectures), held at Howard University, Washington, D.C., May 13-18, 2008

Geophysical Fluid Dynamics Summer School, on "Nonlinear Waves" (11 lectures), Woods Hole Oceanographic Institute, Woods Hole, MA, June 15- August 21, 2009

## PUBLICATIONS

### BOOKS

*Solitons and the Inverse Scattering Transform*, SIAM, Philadelphia, 425 pp., with M.J. Ablowitz, 1981 (also translated and published in Russian and in Japanese)

*Solitons and Coherent Structures*, North Holland, Amsterdam, 487 pp., ed. by D.K. Campbell, A.C. Newell, J.R. Schrieffer & H. Segur, 1986

*Asymptotics Beyond All Orders*, Plenum Press, New York, 389 pp., ed. by H. Segur, S. Tanveer & H. Levine, 1992

## RESEARCH ARTICLES

1. "Analytical Procedure for Determining Hydrogen Peroxide Exhaust Impingement Heating," Rep't GD/C-BTD65-116, General Dynamics/Convair, San Diego, CA, 1965
2. "Stratified Flow into a Contraction," (Ph.D. thesis)  
Rep't AS69-15, University of California, Berkeley, 1969
3. "A limitation on Long's model in stratified fluid flows," *J. Fluid Mech.*, **48**, pp. 161-179, 1971
4. "Method for Solving the Sine-Gordon Equation," *Phys. Rev. Lett.*, **30**, p. 1262, with M.J. Ablowitz, A.C. Newell & D.J. Kaup, 1973 (reprinted in "Series of Selected Papers in Physics," **59**, by the Physical Soc. of Japan)
5. "Nonlinear Evolution Equations of Physical Significance," *Phys. Rev. Lett.*, **31**, p. 125, with M.J. Ablowitz, A.C. Newell & D.J. Kaup, 1973 (reprinted in "Series of Selected Papers in Physics," **59**, by the Physical Soc. of Japan)
6. "The Korteweg-deVries equation and water waves, Part I: Solutions of the equation," *J. Fluid Mech.*, **59**, p. 721, 1973
7. "The Korteweg-deVries equation and water waves, Part II: Comparison with experiments," *J. Fluid Mech.*, **65**, pp. 289-314, with J.L. Hammack, 1974
8. "An Alternative Method to Solve the Korteweg-deVries Equation?," in Nonlinear Wave Motion, ed. by A.C. Newell, *AMS Lect. in App. Math.*, **15**, 1974
9. "The Inverse Scattering Transform - Fourier Analysis for Nonlinear Problems," *Stud. App. Math.*, **53**, pp. 249-315, with M.J. Ablowitz, A.C. Newell & D.J. Kaup, 1974 (reprinted in "Series of Selected Papers in Physics," **73**, by the Physical Soc. of Japan)
10. "The Inverse Scattering Transform: Semi-Infinite Interval," *J. Math. Phys.*, **16**, p. 1054, with M.J. Ablowitz, 1975
11. "Linear vs. Nonlinear Water Waves," *Proc. of Ocean Engin. III*, with J.L. Hammack, 1976
12. "Asymptotic Solutions and Conservation Laws for the Nonlinear Schrodinger Equation, I," *J. Math. Phys.*, **17**, p. 710, with M.J. Ablowitz, 1976
13. "Asymptotic Solutions and Conservation Laws for the Nonlinear Schrodinger Equation, II," *J. Math. Phys.*, **17**, p. 714, 1976
14. "Exact Linearization of a Painlevé Transcendent," *Phys. Rev. Lett.*, **38**, p. 1103, with M.J. Ablowitz, 1977
15. "Asymptotic Solutions for the Korteweg-deVries Equation," *Stud. App. Math.*, **57**, pp. 13-44, with M.J. Ablowitz, 1977
16. "The Korteweg-deVries equation and water waves, Part III: Oscillatory waves," *J. Fluid Mech.*, **84**, p. 337, with J.L. Hammack, 1978
17. "Modelling criteria for long water waves," *J. Fluid Mech.*, **84**, p. 359, with J.L. Hammack, 1978
18. "Solitons as Approximate Descriptions of Physical Phenomena," *Rocky Mtn. J. Math.*, **8**, p. 15, 1978
19. "Nonlinear Evolution Equations and Ordinary Differential Equations of Painlevé Type," *Lett. Nuovo Cim.*, **23**, p. 333, with M.J. Ablowitz & A. Ramani, 1978

20. "On the evolution of packets of water waves," *J. Fluid Mech.*, **92**, p. 691, with M.J. Ablowitz, 1979
21. "Ordinary Differential Equation of Painlevé Type and the Inverse Scattering Transform," in *Math. Methods & Appl. of Scattering Theory*, ed. by J.A. DeSanto, A.W. Seanz & W.W. Zachery, *Lect. Notes in Physics*, **130**, Springer-Verlag, NY, 1979
22. "A Note on Miura's Transformation," *J. Math. Phys.*, **20**, p. 999, with M.J. Ablowitz & M.D. Kruskal, 1979
23. "Long Internal Waves in Fluids of Great Depth," *Stud. App. Math.*, **62**, p. 249, with M.J. Ablowitz, 1980
24. "A Connection Between Nonlinear Evolution Equations and Ordinary Differential Equations of P-Type I," *J. Math. Phys.*, **21**, pp. 715-721, with M.J. Ablowitz & A. Ramani, 1980
25. "A Connection Between Nonlinear Evolution Equations and Ordinary Differential Equations of P-Type II," *J. Math. Phys.*, **21**, p. 1006-1015, with M.J. Ablowitz & A. Ramani, 1980
26. "Resonant Interactions Between Surface and Internal Gravity Waves," *Phys. of Fluids*, **23**, p. 2556, 1980
27. "Asymptotic Solutions of Nonlinear Evolution Equations and a Painlevé Transcendent," *Physica*, **3D**, p. 165, with M.J. Ablowitz, 1981
28. "Viscous Decay of Envelope Solitons in Water Waves," *Phys. of Fluids*, **24**, p. 2372, 1981
29. "Solitons and the Inverse Scattering Transform," in *Proc. of International School of Physics "Enrico Fermi"*, Course LXXX (1980), ed. by A.R. Osborne & P.M. Rizzoli, North Holland, Amsterdam, 1982
30. "On the Periodic Intermediate Long Wave Equation," *J. Phys.A*, **15**, p. 781, with M.J. Ablowitz, A. Fokas, & J. Satsuma, 1982
31. "Soliton models of long internal waves," *J. Fluid Mech.*, **118**, p. 285, with J.L. Hammack, 1982
32. "Integrable Hamiltonian Systems and the Painlevé Property," *Phys. Rev. A*, 3rd series, **25**, p. 1257, with T. Bountis & F. Vivaldi, 1982
33. "Viscous Decay of Long Internal Solitary Waves," *Phys. of Fluids*, **25**, p. 942, with C. Leone & J.L. Hammack, 1982
34. "Comments of Inverse Scattering for the Kadomtsev-Petivashvili Equation," in *Math. Methods in Hydrodyn. & Integrability in Dynam. Syst.*, A.I.P. Conf. Proc. #88, ed. by M. Tabor & Y.M. Treve, p. 211, 1982
35. "Logarithmic Singularities and Chaotic Behaviour in Hamiltonian Systems," in *Math. Methods in Hydrodyn. & Integrability in Dynam. Syst.*, A.I.P. Conf. Proc. #88, ed. by M. Tabor & Y.M. Treve, with T. Bountis, 1982
36. "Wobbling Kinks in  $f^4$  and Sine-Gordon Theory," *J. Math. Phys.*, **24**, p. 1439, 1983
37. "Integrable Models of Shallow Water Waves," in *Nonlinear Phenomena*, Lect. Notes in Phys #189, ed. by K.B. Wolf, Springer-Verlag, NY, p. 212, 1983
38. "Towards a New Kinetic Theory of Resonant Triads," *Contem. Math.*, **28**, p. 281, 1984

39. "An Analytical Model of Periodic Waves in Shallow Water," *Stud. App. Math.*, **73**, pp. 183-220, with A. Finkel, 1985
40. "Basic Form for Riemann Matrices," in Nonlinear Syst. of PDEs in App. Math., ed by B. Nicolaenko, D.D. Holm & J.M. Hyman, *AMS Lect. in App. Math.*, **23**, p. 47, with A. Finkel, 1986
41. "Some Open Problems," *Physica*, **18D**, p. 1, 1986
42. "Nonexistence of Small-Amplitude Breather Solutions in  $f^4$  Theory," *Phys. Rev. Lett.*, **58**, p. 747, with M.D. Kruskal, 1987
43. "The KP Equation and Biperiodic Water Waves," in Nonlinear Evolutions, ed by J. Leon, World Scient., Singapore, p. 517, with J.L. Hammack & N.W. Scheffner, 1987
44. "Asymptotics Beyond All Orders," in Trans of 5th Army Conf. on App. Math & Comp., ARO Rep't 88-1, p. 369, 1988
45. "Two-dimensional Periodic Waves in Shallow Water," *J. Fluid Mech.*, **209**, pp. 567-589, with J.L.Hammack & N. Scheffner, 1989
46. "Solitons," in *Encyclopedia of Physics, 2<sup>nd</sup> Ed.*, ed. by G. Trigg & R. Lerner, VCH Pub., NY, p. 1154, 1991
47. "Stem Waves Along Breakwater", a Discussion, *ASCE J. Waterway, Port, Coastal & Ocean Eng.*, **115**, pp. 542-543, with J.L. Hammack & N.W. Scheffner, 1991
48. "A note on the generation and narrowness of periodic rip currents", *J. Geo. Res.*, **96**, pp. 4909-4914, with J.L. Hammack & N.W. Scheffner, 1991
49. "The Kadomtsev-Petviashvili equation and water waves," in Proc. of Chaos & Order, ed. by N. Joshi & R. Dewar, World Sci., Singapore, pp. 109-120, with J. Hammack & N. Scheffner, 1991
50. "Who cares about integrability?", *Physica D*, **51**, pp.343-359, 1991
51. "Asymptotics Beyond All Orders in a Model of Crystal Growth", *Stud. App. Math.*, **85**, pp. 129-182, with M.D. Kruskal, 1991
52. "Periodic Waves in Shallow Water", Proc. of Int.School of Physics "Enrico Fermi", Course CIX (1988), ed. by A.R. Osborne, North Holland, Amsterdam, pp. 891-914, with J. Hammack & N. Scheffner, 1991
53. "An asymptotic symmetry of the rapidly forced pendulum", *Physica D*, **51**, pp. 109-118, with Chang Y.-H., 1991
54. "An overview of the geometric model", in Asymptotics Beyond All Orders, ed. by H. Segur, S. Tanveer, & H. Levine, Plenum Press, pp. 29-36, 1992
55. "A new formulation for dendritic crystal growth in two dimensions", Asymptotics Beyond All Orders, ed. by H. Segur, S. Tanveer, & H. Levine, Plenum Press, pp. 87-104, with E.A. Coutsias, 1992
56. "A new Hamiltonian amplitude equation governing modulated wave instabilities", *J. Phys. Soc. Japan*, **61**, pp. 1187-1193, with M. Wadati & M.J. Ablowitz, 1992
57. "On integrability and the motion of curves", *Phys. Rev. Lett.*, **69**, pp. 2603-2606, with K. Nakayama & M. Wadati, 1992
58. "Asymptotics Beyond All Orders - A Survey", Chaos in Australia, ed. by G. Brown & A. Opie, World Scientific, Singapore, pp. 150-172, 1993
59. "Analysis of a Hamiltonian Amplitude Equation", *J. Phys. Soc. Japan*, **62**, pp. 1927-1931, with C.C. Chow & S.J. Fromm, 1993

60. "Wave Collapse and Instability of Solitary Waves of a Generalized Kadomtsev-Petviashvili Equation", *Physica* **D78**, pp. 241-265, with X.P. Wang & M.J. Ablowitz, 1994
61. "A note on the motion of surfaces", *Phys. Lett. A*, **194**, pp. 165-172, with R. McLachlan, 1994
62. "Two-dimensional periodic waves in shallow water, part 2: asymmetric waves", *J. Fluid Mech.*, **285**, pp. 95-122, with J.L. Hammack, D. McCallister, & N. W. Sheffner, 1995
63. "A generalized stability criterion for resonant triad interactions", *J. Fluid Mech.*, **319**, pp. 67-76, with C. Chow & D. Henderson, 1996
64. "A Discrete Curve-Shortening Equation", *Methods and Appl. of Analysis*, **4**, pp. 162-172, with K. Nakayama & M. Wadati, 1997
65. "Three-phase solutions of the Kadomtsev-Petviashvili equation", *Studies in Applied Math.*, **99**, pp. 137-203, with B.A. Dubrovin & R. Flickinger, 1997
66. "Motion of curves specified by accelerations", *Physics Letters A*, **224**, pp. 253-263, with T. Tsurumi, K. Nakayama, & M. Wadati, 1997
67. "The KP equation with quasiperiodic initial data", *Physica D* **123**, pp. 123-152, with B. Deconinck, 1998
68. "Oceanic Storm Waves near Shore", submitted for publication, with J.H. Curry, J.L. Hammack, C.E. Long, & N.W. Scheffner, 1997
69. "The motion of a falling liquid filament", *Phys. Fluids*, **12**, p. 550-567, with L. Smolka, M. Wadati, & D. Henderson, 2000
70. "Evolution of a Tracer Gradient in an Incompressible, Two-dimensional Flow", in IUTAM Symp.: Developments in Geophys. Turbulence, ed. by R.M. Kerr & Y. Kimura, Kluwer Pub., pp. 143-150, 2000
71. "Pole Dynamics for Elliptic Solutions of the Korteweg-de Vries Equation", *Math. Phys., Anal. & Geom.*, **3**, pp. 49-74, with B. Deconinck, 2000
72. "Instabilities in the two-dimensional cubic nonlinear Schrodinger equation", *Phys. Rev. E* **68**, 045601, with J.D. Carter, 2003
73. "Progressive waves with persistent, two-dimensional surface patterns in deep water", *J Fluid Mech.*, **532**, pp. 1-51, with J.L. Hammack & D.M. Henderson, 2005
74. "Stabilizing the Benjamin-Feir instability", *J Fluid Mech.*, **539**, pp. 229-271, with D. Henderson, J.D. Carter, J. Hammack, C-M Li, D. Pheiff, K Socha, 2005
75. "Can the Benjamin-Feir instability spawn a rogue wave?", with D.M. Henderson & J.L. Hammack, Proceedings of the 14<sup>th</sup> Aha Huliko'a Winter Workshop, on Rogue Waves, ed. by P. Müller & D. Henderson, 2005
76. "On the laboratory generation of two-dimensional, progressive surface waves of nearly permanent form on deep water", *J. Fluid Mech*, **559**, pp. 412-427, with D.M.Henderson & M. Patterson, 2006
77. "Stable, three-dimensional waves of nearly permanent form on deep water", *Math. & Computers in Simulation*, doi: [10.1016/j.matcom](https://doi.org/10.1016/j.matcom), with W. Craig, D.M. Henderson & M. Ocamou, 2006
78. "Waves in shallow water, with emphasis on the tsunami of 2004", in Tsunami and nonlinear waves, ed. by A Kundu, Springer GeoSc., pp. 3-30, 2007

79. “Integrable models of waves in shallow water”, in *Probability, Geometry and Integrable Systems*, MSRI Publication **55**, pp. 307-333, 2008
80. “Finite-dimensional pole dynamics of solutions of the viscous Burgers equation”, *J. Physics A: Math. Theor.* **40**, 5459-5467, with B. Deconinck & Y. Kimura, 2007
81. “The modulational instability revisited”, *Euro. Phys. Journal*, **147**, 25-43, with D.M. Henderson, 2007
82. “Explosive instability due to 4-wave mixing”, *Phys. Rev. Lett.*, **99**, DOI: 10.1103/PhysRevLett.99.245004, with B.R. Safdi, 2007
83. “Stable deep-water waves propagating in one and two dimensions”, *Proc. in Appl. Math. & Mech.*, **7**, pp. 1101401-1101402, with D. Henderson, 2007
84. “Explosive instability due to 3-wave or 4-wave mixing, with or without dissipation”, *Analysis & Applications*, **6**, pp. 1-16, 2008
85. “Demonstration experiment in the NSF-CBMS Regional Conference on Water Waves”, Conf. Proc. on *Water Waves, Theory and Experiment*, World Scientific, New Jersey, pp. 191-201, with D. Henderson, R. Geist & K. Hammack, 2010
86. “Experimental evidence of stable wave patterns on deep water”, *J. Fluid Mech.*, **658**, pp. 247-278, with D.M. Henderson & J.D. Carter, 2010
87. *Proceedings of the Conference on Water Waves – Theory and Experiment*, ed. by M.F. Mahmood, D. Henderson & H. Segur, World Scientific Pub., New Jersey, 201 pp., 2010
88. “The Benjamin-Feir Instability and Propagation of Swell across the Pacific”, *Math. & Computers in Simul.*, **82**, pp. 1172-1184 with Diane Henderson, 2012
89. “Seismically generated tsunamis”, *Phil. Trans. Royal Soc. London A*, **370**, pp. 1505-1542, doi: 10.1098/rsta.2011.0457, with D. Arcas, 2012
90. “The role of dissipation in the evolution of ocean swell”, *J. Geophys. Res. – Oceans*, **118**, pp. 5074-5091, doi:10.1002/jgrc.20324, with D.M. Henderson, 2013
91. “Dissipation of narrow-banded surface water waves”, *Fields Institute Communications*, **75**, pp. 163-183 with D. Henderson & G.K. Rajan, 2015
92. “Toward a general solution of the three-wave partial differential equations”, submitted to *Studies in Applied Mathematics*, with R. A. Martin, 2015

#### INVITED LECTURES

Given in the U.S., Australia, Canada, China, Denmark, France, Germany, Great Britain, Greece, India, Italy, Japan, Mexico, Poland, South Africa, Spain and the former U.S.S.R.

#### INVITED LECTURES AT RECENT CONFERENCES (SINCE 2011)

- 1) 7<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, April 4-7, 2011
- 2) “Conference on Nonlinear Water Waves”, Erwin Schrödinger Institute, Vienna, AUSTRIA, May 16-17, 2011
- 3) “Mathematics of Extreme Sea Waves: Tsunamis, Rogue Waves and Flooding”, The Fields Institute, Toronto, Ontario, CANADA, June 13-16, 2011

- 4) SIAM Conference on Nonlinear Waves, U. of Washington, Seattle, WA, June 13-16, 2012
- 5) 8<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, March 24-28, 2013
- 6) “Workshop on Ocean Wave Dynamics”, Fields Institute for Research in Mathematical Sciences, Toronto, Ontario, CANADA, May 6-11, 2013
- 7) NSF-CBMS Regional Conference on “Solitons in two-dimensional water waves and applications to tsunamis”, University of Texas/Pan-American, Edinburg, TX, May 20-24, 2013
- 8) “Water waves: Computational Approaches for Complex Problems”, Banff International Research Station, Banff, Alberta, CANADA, July 1-5, 2013
- 9) “Hamiltonian PDEs: Analysis, Computation and Applications”, Fields Institute for Research in Mathematical Sciences, Toronto, Ontario, CANADA, Jan. 9-12, 2014
- 10) “Theory of Water Waves”, Isaac Newton Institute, Cambridge, U.K., July 14-25, 2014
- 11) “Impacts of Waves along Coastlines”, Institute for Mathematics and its Applications, Minneapolis, MN, Oct. 14-17, 2014
- 12) 9<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, April 1-4, 2015

#### SCIENTIFIC ORGANIZING COMMITTEES (since 2009)

- 1) Organizing Committee: Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institute, Woods Hole, MA, July 15-August 21, 2009
- 2) 7<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, April 4-7, 2011
- 3) 8<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, March 24-28, 2013
- 4) 9<sup>th</sup> IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, U. of Georgia, Athens, GA, April 1-4, 2015

#### RESEARCH CONTRACTS

Principal or Co-Principal Investigator on various contracts with the U.S. Army Research Office (Mathematics), the Department of Energy (Applied Mathematical Sciences), the U.S. National Science Foundation (Geophysics, Mathematics, Special Programs, Focused Research Group, VIGRE, MCTP, CCLI), NATO (Scientific Affairs Division), and the U.S. Office of Naval Research (Fluid Mechanics, Physics).