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Curriculum Vitae

Alex Mahalov
Department of Mathematics and Statistics
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Education:

Cornell University -- Ph.D. 1986-91 (Applied Mathematics).
Thesis Advisor: Professor Sid Leibovich

Employment History:

2003- Present, Professor, Arizona State University,
Department of Mathematics and Statistics,
Department of Mechanical and Aerospace Engineering.
1997-2003, Associate Professor, Arizona State University,
Department of Mathematics and Statistics,
Department of Mechanical and Aerospace Engineering.
1991-1997, Assistant Professor, Arizona State University,
Department of Mathematics and Statistics,
Department of Mechanical and Aerospace Engineering.
1991-1992, Postdoctoral Research Associate, University of California at Berkeley,
Department of Mechanical Engineering.
1986-1991, Graduate Research Assistant, Cornell University.

Visiting Positions:

University College London, London, England, EPSRC Visiting Professor,
May 15-June 15, 2002 and 2003. Institute for Advanced Study, School of Mathematics, Princeton, January 2003. Institut Henri Poincaré and Laboratoire de Météorologie Dynamique, Ecole Normale Supérieure, Paris, France, Spring 2001. Ecole Normale Supérieure, Mathematics, Paris, France, June 15-July 15, 1997. Isaac Newton Institute for Mathematical Sciences, Cambridge University, England, August 15-December 15, 1996. NASA Langley Research Center, Institute for Computer Applications in Science and Engineering (ICASE), June 1-June 21, 1996. NASA Langley Research Center, Institute for Computer Applications in Science and Engineering (ICASE), June 12-July 15, 1995. Center for Turbulence Research, Stanford University and NASA Ames Research Center, July 5-29, 1994. NASA Langley Research Center, Institute for Computer Applications in Science and Engineering (ICASE), June 6-July 1, 1994.

Awards:

Mentorship Appreciation Award, Arizona State University, June 2000. Clay Mathematical Institute Ambassador, Fall 2000. College of Liberal Arts and Sciences Interdisciplinary Research Fellowship, Arizona State University, Spring 1999. Rosenbaum Research Fellowship, Isaac Newton Institute for Mathematical Sciences, Cambridge University, 1996. International Business Machines Corporation Graduate Fellowship, 1990-1991. Mathematical Science Institute Graduate Fellowship, Cornell University, 1988-1989.

Refereed Journal Publications:

On time analyticity of the Navier-Stokes equations in a rotating frame with spatially almost periodic data, *Physica D*, 2008 (with Giga, Jo and Yoneda), in press.
Local Smoothness of Weak Solutions to the Magnetohydrodynamics Equations via Blowup Methods, *Equations aux Derivees Partielles*, **7640**, Ecole Polytechnique, p. 21.1-21.19 (with B. Nicolaenko and T. Shilkin).
Global Solvability of the Navier-Stokes Equations in Spaces Based on Sum-Closed Frequency Sets, *Advances in Differential Equations*, **12**, No. 7, p. 721-736, 2007 (with Y. Giga, K. Inui and J. Saal).
Bursting Dynamics of the 3D Euler Equations in Cylindrical Domains, *Instability in Models Connected with Fluid Flows.* International Mathematical Series, Volumes 6 and 7, Edited by C. Bardos and A, Fursikov, Springer 2008 (with F. Golse and B. Nicolaenko).
A posteriori error estimates for viscous flow problems with rotation, *J. Math. Sci.*, **142**, No. 1, p. 1749-1762, 2007 (with E. Gorshkova, P. Neittaanmaki and S. Repin).
Multi-Scale Predictability of High-Impact Stratopsheric Clear Air Turbulence Events, *IEEE Proceedings of the High Performance Computing Modernization Program Conference*, p. 57-63, 2007 (with M. Moustaoui and B. Nicolaenko).
Rotating Navier-Stokes Equations in $\mathbf{R}^3_+$ with Initial Data Nondecreasing at Infinity: The Ekman Boundary Layer Problem, *Arch. for Rational Mech. and Analysis*, **186**, No. 2, p. 177-224, 2007 (with Y. Giga, K. Inui, S. Matsui and J. Saal).
The Cauchy Problem for the Navier-Stokes Equations with Spatially Almost Periodic Initial Data, *Annals of Mathematics Studies*, **163**, p. 213-223, 2007 (with Y. Giga and B. Nicolaenko), Special Issue on Mathematical Aspects of Nonlinear Dispersive PDEs (J. Bourgain, C. Kenig and S. Klainerman, eds.), Princeton University Press.
Navier-Stokes Equations in a Rotating Frame with Initial Data Nondecreasing at Infinity, *Hokkaido Mathematical Journal*, **35**, No. 2, p. 321-364, 2006 (with Y. Giga, K. Inui and S. Matsui).
$L_{3,\infty}$ Solutions to the Magnetohydrodynamics Equations, *Boundary-Value Problems of Mathematical Physics and Related Problems of Function Theory, Part 37*, Zapiski Nauchnyh Seminarov POMI, **37**, p. 112-133 (with B. Nicolaenko and T. Shilkin).
Uniform Local Solvability for the Navier-Stokes Equations with the Coriolis Force, *Methods and Applications of Analysis*, **12**, No. 4, p. 381-394, 2005 (with Y. Giga, K. Inui and S. Matsui).
New Sufficient Conditions of Local Regularity for Solutions to the Navier-Stokes Equations, *J. of Mathematical Fluid Mech.*, 2006 (with B. Nicolaenko and G. Seregin),
Non Blow-Up of the 3D Ideal Magnetohydrodynamics Equations for a Class of Three-Dimensional Initial Data in Cylindrical Domains, *Zapiski of Petersburg Steklov Mathematical Institute*, **318**, p. 1-17, 2004 (with F. Golse and B. Nicolaenko).
Computational Studies of Inertia-Gravity Waves Radiated from Upper Tropospheric Jets, *Theor. and Comp. Fluid Dynamics*, **21**, No. 6, p. 399-422, 2007 (with M. Moustaoui and B. Nicolaenko).
Effects of Rotation and Sloping Terrain on Fronts of Density Currents, *Journal of Fluid Mechanics*, **537**, p. 285-315, 2005 (with JCR Hunt, J.R. Pacheco and HJS Fernando),
Regularity of the Incompressible Euler Equations for a Class of Three-Dimensional Initial Data, *Progress in Nonlinear Differential Equations and Applications*, Birkhauser, Basel, **61**, p. 161-185, 2004 (with C. Bardos, F. Golse and B. Nicolaenko).
Variability of Turbulence and its Outer Scales in a Model Tropopause Jet, *Journal of the Atmospheric Sciences*, **61**, No. 6, p. 621-643, 2004 (with B. Joseph, B. Nicolaenko and K.L. Tse).
Eddy-Mixing in Jet-Stream Turbulence under Stronger Stratification, *Geophys. Research Lett.*, **23**, L23111-

23115, 2004 (with B. Joseph, B. Nicolaenko and K.-L. Tse).
Non Blow-Up of the 3D Euler Equations for a Class of Three-Dimensional Initial Data in Cylindrical Domains, *Methods and Applications of Analysis*, **11**, No. 4, p. 605-633, 2004 (with C. Bardos, F. Golse and B. Nicolaenko).
High Resolution DNS of Shear-Convective Turbulence and its Implications to Second-Order Parameterizations, *Theor. and Comp. Fluid Dyn.*, **17**, No. 5-6, p. 445-462, 2004 (with K.-L. Tse, B. Nicolaenko and B. Joseph).
Quasi-Equilibrium Dynamics of Shear-Stratified Turbulence in a Model Tropospheric Jet, *Journal of Fluid Mechanics*, **496**, p. 73-103, 2003 (with K.-L. Tse, B. Nicolaenko and HJS Fernando).
Global Regularity of the 3D Navier-Stokes Equations with Weakly Aligned Large Initial Vorticity, *Russ. Mathematical Surveys*, **58**, No. 2 (350), p. 287-318, 2003 (with B. Nicolaenko).
High Resolution DNS of Jet Stream Generated Tropopausal Turbulence, *Geophys. Res. Lett.*, **30**, No. 10, p. 32.1-32.5, 2003 (with B. Joseph, B. Nicolaenko and K.L. Tse).
Clear Air and Optical Turbulence in a Jet Stream in the Airborne Laser Context, *Navigator*, Spring 2003, NAVO MSRC, p. 16-21, 2003 (with M. Adams and B. Nicolaenko).
Vortex Tubes in Shear-Stratified Turbulence, Special Issue on ``Tubes, Sheets and Singularities in Fluid Dynamics", Kluwer Academic Publishers, p. 21-32, 2002 (with M. Farge, A. Azzalini, K.-L. Tse, G. Pellegrino and K. Schneider).
3D Navier-Stokes and Euler Equations with Initial Data Characterized by Uniformly Large Vorticity, *Indiana University Mathematics Journal*, **50**, p. 1-35, 2001 (with A. Babin and B. Nicolaenko).
Strongly Stratified Limit of 3D Primitive Equations in an Infinite Layer, AMS Contemporary Mathematics Series, Advances in Wave Interaction and Turbulence, **283**, p. 1-13, 2001 (with A. Babin and B. Nicolaenko).
A Spectral Domain Decomposition Method and its Application to Simulation of Shear-Stratified Turbulence, *Springer-Verlag Lecture Notes in Physics*, **566**, p. 353-378, 2001 (with K.-L. Tse, B. Nicolaenko and HJS Fernando).
Global Regularity of 3D Rotating Navier-Stokes Equations for Resonant Domains, *Indiana University Mathematics Journal*, **48**, No. 3, p. 1133-1176, 1999 (with A. Babin and B. Nicolaenko).
Effects of Rotation on Fronts of Density Currents, *Physics Letters A*, **270**, p. 149-156, 2000 (with J.R. Pacheco, HJS Fernando and JCR Hunt).
Fast Singular Oscillating Limits and Global Regularity for the 3D Primitive Equations of Geophysics, *Mathematical Modelling and Numerical Analysis*, **34**, No. 2, p. 201-222, 2000 (with A. Babin and B. Nicolaenko).
Global Regularity of 3D Rotating Navier-Stokes Equations for 3D Flows with Uniformly large Vorticity, *Letters in Applied Mathematics*, **13**, p. 51-57, 2000 (with A. Babin and B. Nicolaenko).
A Numerical Study of an Operator Splitting Method for Rotating Flows with Large Ageostrophic Initial Data, *Theoretical and Computational Fluid Dynamics*, **13**, p. 143-159, 1999 (with D.A. Jones and B. Nicolaenko).
On Regularity of Solutions of 3D Navier-Stokes equations, *Applicable Analysis*, **71**, p. 197-214, 1999 (with J. Avrin, A. Babin and B. Nicolaenko).
On the Regularity of 3D Rotating Euler-Boussinesq Equations, *Mathematical Models and Methods in Applied Sciences*, **9**, No. 7, p. 1089-1121, 1999 (with A. Babin and B. Nicolaenko).
On Nonlinear Baroclinic Waves and Adjustment of Pancake Dynamics, *Theoretical and Computational Fluid Dynamics*, **11**, No. 3/4, p. 215-235, 1998 (A. Babin and B. Nicolaenko).
Energy Spectra of Strongly Stratified and Rotating Turbulence, *Phys. Rev. E*, **57**, No. 5, p. 6187-6190, 1998 (with B. Nicolaenko and Y. Zhou).
On Hamiltonian Structure and Three-dimensional Instabilities of Rotating Liquid Bridges, *Fluid Dynamics Research*, **24**, p. 37-59, 1998 (with H.-P. Kruse and J.E. Marsden).
On the Asymptotic Regimes and the Strongly Stratified Limit of Rotating Boussinesq Equations, *J. Theor. and Comp. Fluid Dyn.*, **9**, No. 3/4, p. 223-251, 1997 (with A. Babin, B. Nicolaenko and Y. Zhou).
Regularity and Integrability of 3D Euler and Navier-Stokes Equations for Uniformly Rotating Fluids, *Asympt. Anal.*, **15**, No. 2, p. 103-150, 1997 (with A. Babin and B. Nicolaenko).
Regularity and Integrability of Rotating Shallow-Water Equations, *Proc. Acad. Sci. Paris*, **324**, Ser. I, p. 593-598, 1996 (with A. Babin and B. Nicolaenko).
Global Splitting and Regularity of Rotating Shallow-Water Equations, *Europ. J. Mech. B/Fluids*, **16**, No. 5, p. 725-754, 1997 (with A. Babin and B. Nicolaenko).
Resonances and regularity for Boussinesq equations, *Russ. J. Math. Phys.*, **4**, No. 4, p. 417-428, 1996 (with A.

Babin and B. Nicolaenko).
Global Splitting, Integrability and Regularity of 3D Euler and Navier-Stokes Equations for Uniformly Rotating Fluids, *European J. Mechanics B/ Fluids*, **15**, No. 3, p. 291-300, 1996 (with A. Babin and B. Nicolaenko).
Analytical and Phenomenological Studies of Rotating Turbulence, *Phys. of Fluids*, **8**, No. 8, p. 2138-2152, 1996 (with Y. Zhou).
Position-Controllability of a Deformable Body in Ideal Fluid, *Mathematical Models and Methods in Applied Sciences*, **7**, No. 1, p. 139-149, 1997 (with S. Nikitin).
Long-Time Averaged Euler and Navier-Stokes Equations for Rotating Fluids, In Advanced Series in Nonlinear Dynamics, vol. 7: ``Structure and Dynamics of Nonlinear Waves in Fluids'', K. Kirchgässner and A. Mielke (eds), World Scientific, p. 145-157, 1995 (with A. Babin and B. Nicolaenko).
Normal Forms for Three-dimensional Parametric Instabilities in Ideal Hydrodynamics, *Physica D*, **73**, p. 49-81, 1994 (with E. Knobloch and J.E. Marsden).
The Instability of Rotating Fluid Columns Subjected to a Weak External Coriolis Force, *Physics of Fluids A*, **5**, No. 4, p. 891-900, 1993.
Instability Induced by Symmetry Reduction, *Phys. Rev. Lett.*, **68**, No. 15, p. 2257-2260, 1992 (with J. Guckenheimer).
On the Explicit Symmetry Breaking in the Taylor-Couette Problem, *Phys. Lett. A*, **167**, No. 3, p. 251-254, 1992 (with D. Armbruster).
Resonant Triad Interactions in Symmetric Systems, *Physica D*, **54**, p. 267-310, 1992 (with J. Guckenheimer).
On the Calculation of Coupling Coefficients in Amplitude Equations, *Journal of Computational Physics*, **101**, p. 441-444, 1992 (with S. Leibovich).
Multiple Bifurcation of Rotating Pipe Flow, *J. of Theor. and Comp. Fluid Dyn.*, **3**, No. 2, p. 61-77, 1991 (with S. Leibovich).
Weakly Nonlinear Analysis of Rotating Hagen-Poiseuille Flow, *Euro. J. of Mech., B/Fluids*, **10**, No. 2, p. 55-61, 1991 (with S. Leibovich).
Invariant Helical Subspaces for the Navier-Stokes Equations, *Archive for Rational Mechanics and Analysis*, **112**, No. 3, p. 193-222, 1990 (with S. Leibovich and E.S. Titi).
Mathematical Investigation of Periodic Acoustical Waveguides of an Arbitrary Shape, *J. of Math. Anal. and Appl.*,**127**, No. 2, p. 569-576, 1987.
Cauchy Problems for a Certain Class of Operator Differential Equations with Nonsmooth Periodic Coefficients, *J. of Sov. Math.*, **35**, No. 1, p. 2222-2227, 1986 (with V.I. Derguzov).
Investigation of the Statistical Characteristics of the Digital Broadcasting Signals, *Broadcasting and Acoustics*, **3**, p. 3-8, 1983 (with A.S. Grudinin and A.S. Kumushev).

Chapters in Books (Refereed):

Fast Singular Oscillating Limits of Stably Stratified Three-Dimensional Euler and Navier-Stokes Equations and Ageostrophic Wave Fronts, In the Monograph *Large-Scale Atmosphere-Ocean Dynamics*, Cambridge University Press, p. 126-201, 2002 (with A. Babin and B. Nicolaenko).

Papers Accepted for Publication in Refereed Journals:

Bursting Dynamics of the 3D Euler Equations in Cylindrical Domains, *International Mathematical Series. Instability of Models Connected with Fluid Flows.* Springer (with F. Golse and B. Nicolaenko), to appear.

Refereed Conference Publications:

A. Mahalov and B. Nicolaenko (2006), Characterization of Stratospheric Clear Air Turbulence for Air Force Platforms, IEEE Proceedings of DoD High Performance Computing Modernization Program Conference, June, Denver.
F.H. Ruggiero, A. Mahalov, B. Nicolaenko and J. Werne (2005), Characterization of High Altitude Turbulence for Air Force Platforms, IEEE Proceedings of DoD High Performance Computing Modernization Program Conference, p. 226-231, June 27-30, Nashville.
A. Mahalov and B. Nicolaenko (2005), High Resolution Numerical Simulations and Modeling of Optical

Turbulence across Jet Streams, Proceedings of the International Society for Optical Engineering Conference `Atmospheric Optical Modeling, Measurement, and Simulation', **5891**, p. 1081-1089, San Diego.
W.P. Brown, B.J. Foucault, A. Mahalov, B. Nicolaenko, F.H. Ruggiero and J. Werne (2002), Atmospheric Propagation, Adaptive Optics, and Turbulence Characterization Studies for the Airborne Laser, DoD High Performance Computing Modernization Program (HPCMP) Conference, Austin, Texas, June 10-13, 2002 (26 pages).
N.S. Berman, H.J.S. Fernando, E. Pardyjak, F. Yu, A. Mahalov and A. Grachev (1998), A Study of the Turbulent Mixing in the Atmospheric Boundary Layer of Phoenix, Arizona, Proceedings of the ASME/JSME Fluids Engineering Division Summer Meeting, July 18-23, San Francisco.
A. Mahalov, B. Nicolaenko and H.J.S. Fernando (1998), Development and Verification of Experimental Data Bases for Pancake Structures in Atmospheric Flows, 12th Annual International Symposium on Aerospace and Defense Sensing, Simulation and Controls, vol. 3381, p. 239-245.
A. Mahalov and P.S. Marcus (1995), Long Time Averaged Rotating Shallow Water Equations, Proc. of the First Asian Computational Fluid Dynamics Conference, Hong Kong, eds. W.H. Hui, Y.-K. Kwok and J.R. Chasnov, vol. 3, p. 1227-1230.
A. Mahalov (1994), On the Transition Towards Slow Manifold in 3D Euler and Shallow-Water Equations in a Rotating Frame, Center for Turbulence Research, Proc. of the 1994 Summer Program, Stanford University and NASA Ames Research Center, p. 373-382.

Other Refereed Research Publications:

HJS Fernando, A. Mahalov and B. Nicolaenko (2007), Environmental Fluid Mechanics, vol. 7, No. 5, p. 349-350, guest editors review of the Special Issue on Optical Turbulence in the Atmosphere.
A. Mahalov (2003), European Journal of Mechanics B/Fluids, vol. 22, p. 525-527, review of the book ``Navier-Stokes Equations and Turbulence'' by C. Foias, O. Manley, R. Rosa and R. Temam, Cambridge University Press.
A. Mahalov and Y. Zhou (1995), Analytical and Phenomenological Studies of Rotating Turbulence, ICASE Report No. 95-72, NASA Langley Research Center.
A. Babin, A. Mahalov, B. Nicolaenko and Y. Zhou (1997), On the Asymptotic Regimes and the Strongly Stratified Limit of Rotating Boussinesq Equations, ICASE Report No. 97-18, NASA Langley Research Center.

Papers Submitted for Publication in Refereed Journals:

Nonlinear Stability of Ekman Boundary Layers, *Mathematische Zeitschrift*, 2007 (with M. Hess, M. Hieber and J. Saal), submitted for publication.
On time analyticity of the Navier-Stokes equations in a rotating frame with spatially almost periodic data, *Physica D*, 2008 (with Giga, Jo and Yoneda), submitted for publication.

Invited Lectures at Universities and Research Centers:

Colloquium, Oxford Centre for Analysis and Nonlinear PDEs, December 3, 2007 (invited by Prof. Sir John Ball, President of the International Mathematical Union).
Oxford Centre for Industrial and Applied Mathematics (OCIAM) Seminar, December 4, 2007.
Seminaires fluides et plasmas en astrophysique, LUTH, Observatoire de Paris-Meudon, October 24, 2007.
Colloquium, European Centre for Medium Range Weather Forecast (ECMWF), Reading, UK, May 31, 2007.
PDE Seminar, School of Mathematics, University of Minnesota, April 11, 2007.
Colloquium, Department of Mathematics and the Center for Scientific Computing and Mathematical Modeling (CSCAMM), University of Maryland, February 8, 2005.
Colloquium, Department of Mathematics, Technical University of Berlin, November 24, 2005.
Colloquium, Steklov Mathematical Institute, St Petersburg, November 21, 2005.
Colloquium, Department of Meteorology, University of Maryland, February 10, 2005.
Colloquium, Department of Mathematics, The University of Tokyo, Japan, September 29, 2004.
Symposium on Nonlinear Dispersive Equations, Hokkaido University, Sapporo, Japan, September 23-24, 2004.
Workshop on ``Analysis of non-linear PDEs'', School of Mathematics, Institue for Advanced Study, Princeton, March 23-26, 2004.

Colloquium, Center for Scientific Computation and Mathematical Modeling (CSCAMM), University of Maryland, November 26, 2003.
GALCIT Fluids Colloquium, California Institute of Technology, October 10, 2003.
Department of Applied Mathematics and Theoretical Physics (DAMTP), Cambridge University, May 20, 2003.
Institute for Advanced Study, School of Mathematics, Princeton, January 9, 2003.
Colloquium, Department of Mathematics, University of Wisconsin, November 11, 2002.
California Institute of Technology, The Center for Integrative Multiscale Modeling and Simulation Colloquium, October 30, 2002.
Colloquium, Department of Mathematics, University of Ferrara, Italy, May 9, 2002.
University of Minnesota, Institute of Mathematics and its Applications (IMA) Thematic Year on the Mathematics in the Geosciences, February 11-15, 2002.
Centre de Mathematiques, Ecole Polytechnique, Colloquium in Partial Differential Equations, December 18, 2001.
Courant Institute of Mathematical Sciences, New York University, Analysis Seminar, December 11, 2001.
Courant Institute of Mathematical Sciences, New York University, Colloquium in Atmosphere and Ocean Sciences, Friday, December 7, 2001.
Seminar at the Laboratoire Meteorologie Dynamique, Paris, France, October 9, 2001.
Institut Henri Poincare, University of Paris, Seminar in the special program ``Limites Hydrodynamiques: Resultats et Perspectives'', September 24-28, 2001.
Stanford University, Department of Mathematics, Workshop on Conservation Laws and Boltzmann Equation, July 23-27, 2001.
Colloquium at the Oxford Centre for Industrial and Applied Mathematics (OCIAM), University of Oxford, England, June 7, 2001.
Mathematical Institute, Applied Dynamical Systems Seminar, University of Oxford, England, June 5, 2001.
Partial Differential Equations Seminar Series, Institute of Mathematics, University of Vienna, Austria, June 1, 2001.
Texas A & M University, Partial Differential Equations in Fluid Dynamics Seminar Series, Department of Mathematics, May 4, 2001.
Applied Mathematics and Mechanics Colloquium at the University of Nice, April 29, 2001.
Hull Institute for Mathematical Sciences and Applications, England, Inaugural Workshop on Mathematical Fluid Dynamics, April 10, 2001.
Princeton University, Colloquium in the Program in Applied and Computational Mathematics, October 16, 2000.
Princeton University, Program in Atmospheric and Oceanic Sciences, Seminar in the Geophysical Fluid Dynamics Laboratory (GFDL), October 18, 2000.
Georgia Tech, Colloquium in the School of Mathematics, Atlanta, Georgia, April 3, 2000.
Brown University, Department of Mathematics, PDE Seminar, March 15, 2000.
University of California at San Diego, Dynamical Systems and Controls/Fluid Mechanics Colloquium, Department of Mechanical and Aerospace Engineering, October 8, 1999.
Cornell University, Department of Mechanical and Aerospace Engineering, International Conference on ``Fluid Mechanics and the Environment: Dynamical Approaches'', August 23-24, 1999.
Ecoles Normales Superieures de Paris et de Cachan, International Workshop on Control in Fluid Mechanics and Combustion, Paris, France, October 14-17, 1998.
University of Warwick, Mathematics Institute, Warwick Symposium on Computation and Mathematics, England, September 21-25, 1998.
Ecole Normale Superieure Paris, Mathematics, PDE Seminar, Paris, France, June 10, 1997.
Technische Univeristat Berlin, Colloquium, Mathematik, May 29, 1997.
University of California at Santa Barbara, International workshop on ``Dynamical Systems and Statistical Mechanics Methods for Coherent Structures in Turbulent Flows'', Santa Barbara, February 12-13, 1997.
Isaac Newton Institute for Mathematical Sciences, Cambridge University, England, Programme on ``The Mathematics of Atmosphere and Ocean Dynamics'', July 1- December 31, 1996 (a series of four lectures).
Universitat Hamburg, Institut fur Angewandte Mathematik, Mathematics Colloquium, July 15, 1996, Hamburg, Germany.
University of Chicago, Department of Mathematics, PDE Seminar, February 20, 1996.
Florida State University, Geophysical Fluid Dynamics Institute, Colloquium, January 29, 1996.

Isaac Newton Institute for Mathematical Sciences, Cambridge University, England, International Workshop on ``Inertial Manifolds, Approximate Inertial Manifolds, and Nonlinear Galerkin Methods", October 9-13, 1995.
University of California at Berkeley, Department of Mathematics, Geometric Mechanics Seminar Series, March 7, 1995.
University of Arizona (Tucson), Department of Mathematics, Applied Mathematics Seminar, April 21, 1994.
California Institute of Technology, Department of Applied Mechanics, Dynamical Systems Seminar, Pasadena, November 25, 1992.

Invited Lectures at Meetings:

The Theory of Highly Oscillatory Problems, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, 26 March to 30 March 2007, Pleanary Talk. Recorded Webcasts of my pleanary talk and seminars are on the website
http://www.newton.cam.ac.uk/webseminars/pg+ws/2007/hop/hopw02/0327/mahalov/
High Perfoirmance Computing Modernization Program (HPCMP) Annual Meeting, Pittsburgh, June 18-21, 2007.
International Conference dedicated to 300th Birthday of Leonard Euler "Mathematical Hydrodynamics: Euler Equations and Related Topics", June 7-9, 2007, Saint-Petersburg, Russia (http://www.pdmi.ras.ru/ eec300/).
6th International Congress on Industrial and Applied Mathematics (ICIAM07), Mini-Symposium on Navier-Stokes Equations and Related Topics, 16-20 July, 2007, Zurich.
Lighthill Institute of Mathematical Sciences (LIMS) Workshop on Applied Mathematics in Defense Applications, London, May 31-June 1, 2007.
SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, February 15, 2007.
International Conference on ``Rotating Fluids in Geophysics", Bernoulli Mathematical Institute, EPFL Lausanne, September 19-22, 2006.
Kyoto Conference on the Navier-Stokes Equations and their Applications, Research Institute for Mathematical Sciences, Kyoto University, Japan, January 6-10, 2006.
International Conference on ``Chaos and Disorder in Mathematics and Physics" dedicated to 70th Birthday of Prof. Sinai, Bressanone, Italy, September 18-24, 2005.
International Society for Optical Engineering Conference on Atmospheric Optical Modeling, Measurement and Simulation, San Diego, August 2-3, 2005.
EQUADIFF 11 International Conference on Differential Equations, Comenius University, Bratislava, Slovakia, July 25-29, 2005.
DoD High Performance Computing Modernization Program Annual Meeting, Nashville, June 27-30, 2005.
AFOSR Workshop on Stratospheric Turbulence, AFRL, Hanscom AFB, May 24-26, 2005.
European Geophysical Union (EGU) Annual Meeting, Vienna, April 28, 2005.
Workshop on ``Deterministic and Stochastic Navier-Stokes Equations", American Institute of Mathematics, Palo Alto, March 14-18, 2005.
Fulton School of Engineering High Performance Computing (HPC) Center, High Performance Computing of Environmental Flows, November 17, 2004, Arizona State University.
International Conference ``Partial Differential Equations in Mathematical Physics" in memory of O.A. Ladyzhenskaya, October 24-30, 2004, Trento, Italy.
Lockheed-Martin Seminar, Modeling and High Resolution Simulations of Optical and Clear Air Turbulence in the Stratosphere, October 11, 2004, Arizona State University.
International Conference ``Turbulence and Waves in Stably Stratified Atmospheric Shear Flows: Measurements, High Resolution Simulations and Numerical Prediction Challenges", Lighthill Institute of Mathematical Sciences, London, September 13-15, 2004.
International Conference on Navier-Stokes Equations, Keio University, Tokyo, Japan, May 6-8, 2004.
AFOSR-ABL Optical Turbulence Workshop, Hanscom AFB, MA, September 25-26, 2003 (presentation recorded on the conference CD).
International Workshop on Navier-Stokes Equations, November 6-9, 2003, Ferrara, Italy.
International Conference on Regularity and Other Qualitative Aspects of the Navier-Stokes Equations, Institute of Mathematics, Polish Academy of Sciences, September 1-9, 2003.
The 5th International Congress on Industrial and Applied Mathematics, Symposium on the Navier-Stokes

Equations and Applications, Sydney, Australia, July 7-11, 2003.
Fourth International Conference on Dynamical Systems and Differential Equations, Symposium in Singular Perturbation and Propagation of Waves, Wilmington, USA, May 24-27, 2002.
DoD High Performance Computing Modernization Program (HPCMP) Annual Meeting, Austin, Texas, June 10-13, 2002.
AFOSR-ABL Atmospheric Workshop, Kirtland AFB, New Mexico, April 9-11, 2002 (presentation recorded on the conference CD).
CNRS-NSF Workshop on 3D Stratified and Sheared Turbulent Flows: Comparison between DNS, LES and Observations, Paris, December 20, 2001.
International Conference on Theoretical and Numerical Fluid Dynamics, August 22, 2001, Vancouver, Canada.
Lectures on Modeling of Optical Turbulence in the Stratosphere at the AirForce Weather Agency (AFWA), Offutt AFB, Omaha, Nebraska, August 6-7, 2001.
NASA Workshop "NAST Hyperspectral Data: Implications for Numerical Weather Prediction and Turbulence Studies", NASA Langley Research Center, Virginia, June 22, 2001.
AFOSR Contractors/Grantees Meeting, Computational and Applied Mathematics, Stanford University, June 28-30, 2000.
Workshop on Analytical and Statistical Approaches to Fluid Models, Oberwolfach, Germany, September 3-9, 2000.
Joint SIAM-AMS Summer Research Conference ``Dispersive Wave Turbulence", Mt. Holyoke College, June 11-15, 2000.
Joint AMS-SIAM Meeting, Special Session on Navier-Stokes Equations, Washington, D.C., January 19-22, 2000.
Fourth International Congress on Industrial and Applied Mathematics, Mini-Symposium on the Mathematical Problems in Atmosphere and Ocean Dynamics, July 5-9, 1999, Edinburgh, Scotland.
Fifth SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 23-27, 1999.
Seminar at the Woods Hole Oceanographic Institution Summer Program in Geophysical Fluid Dynamics, July 8, 1998.
International Conference on ``Turbulence: Challenges for the 21st Century", Center for Nonlinear Studies, Los Alamos National Laboratory, May 18-21, 1998.
IUTAM Symposium on ``Trends in Applications of Mathematics to Mechanics (STAMM 98)", Nice, France, May 25-29, 1998.
International workshop on ``Vortex Dynamics in Geophysical Flows", Castro Marina, Italy, June 22-26, 1998.
Geophysics of Atmospheric Turbulence Workshop, Geophysics Directorate, Phillips Laboratory, Hanscom AFB, Massachusetts, September 3-4, 1997.
Seminar at the Numerical Weather Prediction Division, UK Meteorological Office, Bracknell, United Kingdom, June 19, 1997.
Conference on ``Stratified and Rotating Turbulence", National Center for Atmospheric Research, Boulder, Colorado, July 30-August 2, 1996.
Conference on ``Dynamical Systems Methods in Fluid Mechanics", Mathematics Institute, Oberwolfach, Germany, June 30-July 6, 1996.
Seminar at the Institute for Computer Applications in Science and Engineering (ICASE), NASA Langley Research Center, Hampton, Virginia, June 20, 1996.
Center for Nonlinear Studies, Los Alamos National Laboratory, Scaling Dynamics and Fluid Turbulence Workshop, August 11-14, 1995.
NSF-CBMS Conference on Approximation Dynamics with Applications to Numerical Analysis, Columbia, Missouri, June 1-5, 1995.
Los Alamos National Laboratory, Frontiers of Geostrophic Turbulence and Subgrid Modeling Workshop, August 8-13, 1994.
American Mathematical Society, Special Session on Nonlinear Topics and Critical Phenomena in PDE's, KSU, March 25-26, 1994.
Los Alamos National Laboratory, Frontiers of Statistics and Dynamics of Turbulence Workshop, July 27-Aug. 6, 1993.
Workshop on Pattern Formation, Fields Mathematical Institute, Waterloo, Canada, March 23-28,1993.
Workshop on Normal Forms and Homoclinic Chaos, Fields Mathematical Institute, Waterloo, Canada, Nov. 13-

16, 1992.
US-USSR Workshop on Nonlinear Processes in Physics, Crarkson University, NY, Aug. 1-10, 1991.
IUTAM International Conference on Hydrodynamic Stability and Transition, September 3-7, Nice, France, 1990.

Post-Doctoral Fellows Supervised:

Dr. Rafael Pacheco (2000), Dr. Binson Joseph (2000-2003), Dr. T. Shilkin (Fall 2004), Dr. Frank Tse (2000-2004), Dr. K. Inui (Fall 2005), Dr. M. Moustaoui (current), Dr. S. Ibrahim (current), Dr. J.J. Liu (current).

Teaching and Curriculum Development:

Undergraduate courses taught at ASU: MAT 242 (linear algebra), MAT 274 (ordinary differential equations), MAT 300 (mathematical structures), MAT 342 (advanced linear algebra), MAT 371 (advanced calculus), MAT 462 (applied partial differential equations), MAT 475 (differential equations), MAT 476 (partial differential equations).
Graduate courses taught at ASU: MAT 551 (linear operators and integral equations), MAT 574 (ordinary differential equations), MAT 560 (dynamical systems methods in fluid dynamics), MAT 562 (nonlinear analysis of partial differential equations in fluids), MAT 576 (theory of partial differential equations), MAT 598 (special topics, see below).
Interdisciplinary Environmental Transport Course MAT 598-MAE 591-ChE 598-CEE 598 (jointly with N. Berman, Chemical Engineering; H.J.S. Fernando, Mechanical Engineering; P. Johnson, Civil Engineering). The development of this course was part of the Provost initiative ``Ecology and Environmental Transport".
Development of a new graduate level course on Parallel Computation. The catalyst for my course development was Intel's Software College. Intel provided funds for Intel's Software College special on-site 3 days course ``Scientific Computing on Itanium-based Systems" October 5-7, 2004 at ASU. The Memorandum of Understanding (MOU) provides the general principles and key terms for cooperation between ASU and Intel.
Developed a new graduate level course MAT 560 ``Dynamical Systems Methods in Fluid Dynamics".
Developed a new graduate level course MAT 562 ``Nonlinear Analysis of Partial Differential Equations in Fluids".
Administration of graduate qualifying and comprehensive examinations in Differential Equations, Dynamical Systems and Fluid Dynamics.

Educational Impact:

Chair of Undergraduate Honors Thesis of Steffen Eikenberry, Fall 2005. Steffen is a winner of Arizona Power Authority Fellowship and Fulton Undergraduare Research Award (three semesters starting in Spring 2006).
I was nominated by the Intel Foundation to serve as an Intel Special Judge for Intel Science and Engineering Fair 2004 (ISEF 2004). ISEF 2004 was held in Portland, May 9-14. I was judging in the Mathematics Category. The Intel ISEF is the world's largest pre-college science competition that provides an opportunity for the world's best young scientists and inventors to come together to share ideas, showcase cutting-edge science projects, and compete for awards and scholarships.
Supervision of PhD's and Masters theses of Chandran Nair (Masters, 1997), Haruhito Murakami (Masters, 1997), Patrick Mulhall (Masters, 1998, co-advisor), Luan Thach Hoang (Masters, 2000, co-advisor), Fengjun Yu (Masters, CEAS, 2000, co-advisor), Markus Trahe (PhD, 2002, co-advisor), Bong-Sik Kim (PhD, 2003, co-advisor), Victor Ochkur (PhD, current), Jamshed Ghoush (PhD, current), Michael Ludian (PhD, current).
PhD Committee Member for 8 Doctoral Engineering Students and 6 Other Mathematics Students.
Co-Chair of Undergraduate Honors Thesis of Joel Hindorff (Goldwater Fellow in Mathematics), 1998.
Advisor of Marguerite George (Gates Millennium Scholar) under Preparing Future Faculty Program, 2000.
Advisement/Supervision of Honors projects in undergraduate differential equations class (MAT 274).
Coached ASU Putnam team for the 55th Annual Putnam Mathematical Competition. Ten ASU undergraduate mathematics students participated in the competition. Robert Sussland appeared on the list of ``Top Participants in the 55th Annual Putnam Mathematical Competition".
Lectured for Undergraduate Students: ``An Introduction to Bifurcation Theory" at the Society of Physics Students, Fall Zone Meeting, November 18-20, 1994, ASU.

Organization of Professional Meetings, Conferences and Workshops:

Co-Organizer, International Environmental Hydraulics Symposium, Arizona State University, December 3-7, 2007.
Co-Organizer, Mini-Symposium on Navier-Stokes Equations and Related Topics, 6th International Congress on Industrial and Applied Mathematics (ICIAM07), 16-20 July, 2007, Zurich.
Basil Nicolaenko Memorial Distinguished Lectures in Nonlinear Studies, October 8, 2007, Arizona State University, Co-Organizer (http://math.asu.edu/ byn/memorial/).
International Conference dedicated to 300th Birthday of Leonard Euler "Mathematical Hydrodynamics: Euler Equations and Related Topics", June 7-9, 2007, Saint-Petersburg, Co-Chairman (http://www.pdmi.ras.ru/ eec300/).
AFOSR Workshop on Multiscale Atmospheric Turbulence and High Performance Computing at Arizona State University Decision Theater. ``Challenges of Multiscale Atmospheric Turbulence: High Performance Computing, Physical Modeling and Observational Advances". December 14-16, 2006, Orchid House (Decision Theater at ASU), Co-organizer (with B. Nicolaenko).
Co-organizer (with Mac Hyman and Edriss Titi) of an international conference on ``Emerging Paradigms in Nonlinear Science", Los Alamos National Laboratory, Center for Nonlinear Studies, January 25-28, 2006.
Co-organizer (with Julian Hunt) of an international conference on ``High Spatio-Temporal Gradients in Geophysical Numerical Models", Lighthill Institute of Mathematical Sciences, June 20-22, 2006.
Co-organizer of an international conference on ``Waves and Turbulence in Stably Stratified Atmospheric Shear Flows: Measurements, High Resolution Simulations and the Numerical Prediction Problems", Lighthill Institute of Mathematical Sciences, London, September 13-15, 2004. Selected conference papers will be published in the journal `Theoretical and Computational Fluid Dynamics' (Guest Editor).
Member of the Program Committee. 3rd International Symposium on Environmental Hydraulics, December 5-8, 2001, Tempe, AZ.
Co-organizer (invited) of two mini-symposia "Mathematical and Computational Issues in Turbulence and Balanced Dynamics for Geophysical Flows, I and II" at the Fourth International Congress on Industrial and Applied Mathematics, July 5-9, 1999, Edinburgh, Scotland.
Organizer, Minisymposium on ``Mathematical and Computational Issues in Geophysical Fluid Dynamics and Turbulence", 5th SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 23-27, 1999.
Co-organizer of an international conference ``Fluid Mechanics and the Environment: Dynamical Approaches", Cornell University, Ithaca, NY, August 23-24, 1999.
Co-organizer of an international conference on ``Advances in Geophysical Fluid Dynamics and Turbulence" at ASU, May 16-19, 1996. Selected conference papers are published in a special issue of ``Theoretical and Computational Fluid Dynamics", Springer-Verlag (Guest Editor).

Professional Service:

Fall 2007, Fundraising for the Basil Nicolaenko Distinguished Nonlinear Studies Endowment. This endowment in the ASU Foundation shall support a distinguished lecture series, scholarships, fellowships and other academic programs in nonlinear studies. Representatives from the ASU Department of Mathematics and Statistics, the College of Liberal Arts and Sciences and the Ira A. Fulton School of Engineering will select the speakers for the lecture series and also scholarship and fellowship recipients from qualified students enrolled at Arizona State University in degree programs that are associated with nonlinear studies.
Intel Special Judge for Intel Science and Engineering Fair 2004png (ISEF 2004), Portland, May 9-14, 2004.
Referee proposals for NSF, AFOSR, DOE and U.S. Civilian Research and Development Foundation (CRDF).
Reviewer for various professional journals (SIAM J. on Mathematical Analysis, Physical Reviews and Physical Reviews Lett., SIAM J. on Applied Math., J. Fluid Mech., Indiana University Math. Journal, Phys. of Fluids, Nonlinearity, Transactions of the American Mathematical Society, Journal of the Atmospheric Sciences).
Guest Editor, 1996, ``Theoretical and Computational Fluid Dynamics", Springer-Verlag, special issue on advances in geophysical fluid dynamics and turbulence.
Referee book proposals for Oxford University Press.

Committees:

Member, Committee on Cooperation Between the University College London/Lighthill Institute of Mathematical Sciences and ASU, September 2004-present.
Member, University Committee on High Performance Computing (HPC) in the Fulton School of Engineering, May 2004-Present.
Member of the Executive Committee. Certificate Program in Atmospheric Science at ASU, Spring 2002-Present.
Member, Review Committee, Department of Mathematics, May 2004-Present.
Member, Personnel and Budget Committee, Department of Mathematics, May 2002-May 2003.
Member, Colloquium and Math Awareness Committee, Department of Mathematics, 2000-2002.
Member, Undergraduate Advisory Committee, Department of Mathematics, 1998-2002.
Member, Visiting Faculty Committee, Department of Mathematics, 1999.
Member, Graduate Advisory Committee, Department of Mathematics, 1996 and September 2002-Present.

University-Industry Cooperation:

ASU-Intel Cooperative Program on High Performance Computing (HPC) of Environmental Flows. Intel provides state-of-the-art Intel Itanium2 servers and resources to jointly port, tune, and optimize environmental fluid dynamics software codes and underlying HPC cluster infrastructure for the Itanium platform.
Memorandum of Understanding (MOU) provides the general principles and key terms for cooperation between ASU and Intel.
Management of massively parallel high performance computing cluster (Multi-Core Intel Xeon processors) dedicated to research and educational activities in Environmental and Space Sciences.

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