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Prof. of Civil & Environmental Engin. (joint appt.), 2002-2010
Visiting Professor, Rutgers, 1991-1992
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Associate Professor, Univ. of Michigan, 1982-1988
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Professional Societies: American Meteorological Society
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Associate Editor, Journal of Computational Physics, 1996-2012
Associate Editor, Communications in Computational Physics, 2006- 2014
Associate Editor, SIAM Classics, 2007-
Associate Editor, Studies in Applied Mathematics, 2014-
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PUBLICATIONS

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Springer-Verlag, 792 pp. (1989),
2d edition, Dover (2001)

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"Boundary Value Methods for Solitary Waves", with S. E. Haupt 6th Conference on Atmospheric & Oceanic Waves and Stability, Seattle, August, 1987

"Generalized Quasi-Solitary Waves", 6th Conference on Atmospheric & Oceanic Waves & Stability, Seattle, August, 1987

"Finite Difference Acceleration of Pseudospectral Methods", SIAM National Meeting, Denver, October, 1987

"The LaSC Interdisciplinary Degree Program in Scientific Computing", Cornell, July, 1988

"Weakly Non-Local Solitary Waves", Liege Colloquium on Hydrodynamics, Liege, Belgium, May, 1988

"Weakly Non-local Solitary Waves", SIAM National Meeting, Minneapolis, July, 1988

"Nonlinear Waves" [3 lectures], Enrico Fermi Summer School, Varenna, Italy, August, 1988

"Thermal Convection Around a Fusion Apparatus", with S. Wineberg et al., SIAM National Meeting, San Diego, July, 1989

"New Directions in Nonlinear Waves", invited review, IAMAP, Reading, England, August, 1989

"Sum-Accelerated Pseudospectral Methods", SIAM National Meeting, Chicago, July, 1990

"Spectral Element Methods for an Elliptical Journal Bearing", SIAM National Meeting, Chicago, July, 1990 (with Schumack and Schultz)

"Spectral Methods for an Elliptical Journal Bearing", Fluid Section, American Physical Society, Ithaca, New York, November, 1990 (with Schumack and Schultz)

"A Three-Dimensional Spectral Element Model with Focusing Resolution: Application to Deep Water Formation", Ocean Society Meeting, Washington DC, March, 1991 (with Marshall, Evans, and Haidvogel)

"Weakly Nonlocal Solitary Waves", ICIAM 91, Washington DC, July, 1991

"Sum Acceleration Methods", CHAMMP Workshop on Numerical Methods for Fluids in Spherical Geometry, Boulder, October, 11, 1991

"The Energy Spectrum of Fronts", 8th Conference on Atmospheric and Oceanic Waves and Stability, AMS, Denver, October 15, 1991

"Sum Acceleration Methods & Tikhonov Regularization", International Conference on Spectral and High Order Methods (ICOSAHOM '92), Monpellier, France, June 25, 1992

"Defeating the Runge Phenomenon by Tikhonov Regularization",
DOE Scientific Computing Workshop, Albuquerque, Feb. 4, 1993

"New Spectral Algorithms", Third CHAMMP Workshop on Numerical
Methods for PDEs on the Sphere, Oak Ridge, Tennessee,
April, 1993

"The Slow Manifold", 9th Conference on Atmospheric & Oceanic
Waves and Stability", San Antonio, May, 1993

"Time-Marching on the Slow Manifold: The Relationship
Between the Nonlinear Galerkin Method and Implicit
Timestepping Algorithms", SIAM National Meeting, San Diego,
July 25, 1994

"The ErfcLog Filter", CHAMMP Workshop for PDEs on the
Sphere, Chicago, August 26, 1994.

"Space Adaptive Spectral Filtering", LaSC Conference,
Ann Arbor, October 13, 1994

"Hyperasymptotic Perturbation Theory", Los Alamos, May 15, 1995

"The erfc-log filter and the asymptotics of the Euler &
Vandeven sequence accelerations", ICOSAHOM, Houston,
June, 1995

"Triangular spectral element methods for geophysical
fluid dynamics applications", ICOSAHOM, Houston,
June, 1995 (with B. A. Wingate)

"Numerical Solutions to the Elliptical Journal Bearing",
APS Fluid Sections, August, 1995 (with W. Schultz & H. Han)

"Strong vortices & weakly nonlocal solitary waves in the
ocean and atmosphere", SIAM National Meeting, October 20, 1996

"Exponential asymptotics and Chebyshev polynomials",
SIAM National Meeting, October 20, 1996

"Hyperasymptotic perturbation theory and numerical studies
of nonlocal solitary waves with application to
near-equatorial ocean vortices", 11th Conference on
Atmospheric & Oceanic Fluid Dynamics, June 23, 1997

"Propagation of Kelvin wave packet in equatorial ocean",

with Guan-yu Chen, 11th Conference on
Atmospheric & Oceanic Fluid Dynamics, June 24, 1997

"Variational data assimilation for atmospheric solitary
waves", 11th Conference on Atmospheric & Oceanic
Fluid Dynamics, June 26, 1997

"Compatibility Conditions for Time-Dependent Partial
Differential Equations and the Rate of Convergence of
Chebyshev and Fourier Spectral Methods", with N. Flyer,
6th Workshop on PDEs on the Sphere, Gatlinburg, TN,
April 29, 1998

“The NLS/KdV Connection”, with G.-Y. Chen, IMACS
Nonlinear Wave Conference, U. of Georgia, April, 1999.

"Pseudospectral Methods Versus Dealiased,
High Order Finite Differences", 8th Workshop on PDEs
on the Sphere, San Francisco, Dec., 1999.

"Prolate Spectral Elements", 10th Workshop on PDEs on the Sphere,
Toronto, August 13, 2002

"Corner Waves", 3rd IMACS Conference on Nonlinear Waves,
Athens, Georgia, April 10, 2003

"Nonlinear equatorial waves: Rossby vortices and Kelvin fronts", 14th AMS Dynamics
conference, June, 2003

"Corner and Near-Corner Waves: Matched Asymptotics and Pseudospectral
Algorithms for Slope-Discontinuous Limits of Cnoidal Waves with Applications
to Whitham's Equation Family and Oceanic Equatorial Kelvin Waves"
Montreal, June, 2003

"The Cnoidal/Corner Wave/Breaking Scenario for Equatorial Kelvin Waves", AGU Ocean
Sciences Meeting, Portland, Jan. 30, 2004

"Chebyshev Solution of the Nearly-Singular One-dimensional Helmholtz Equation and
Related Singular Perturbation Equations: Multiple Scale Series and Exact Particular Integral
for Polynomial Forcing", ICOSAHOM 2004, Brown University, Providence, July, (2004).

"Prolate Spheroidal Wavefunctions as an Alternative to Chebyshev and Legendre
Polynomials", ICOSAHOM 2004, Brown University, Providence, July, (2004).

"Corner and Near-Corner Waves: Matched Asymptotics and Mapped Fourier Algorithms Applied to the Corner Wave Bifurcation", SIAM Nonlinear Waves Conference, Orlando, October (2004).

"Why Newton's Method is Hard for Travelling Waves: Small Denominators, KAM Theory, Arnold's Linear Fourier Problem, Non-Uniqueness, Constraints and Erratic Failure, IMACS Waves '05, Athens, Georgia (2005).

"New Developments in Spectral Methods: Defeating Gibbs'Phenomenon and Spectrally-Accurate Nesting", PDEs on the Sphere, Monterey, June (2006).

"Multiscale Issues in Geophysical Fluid Dynamics", Army Research Office Workshop on Computational Multiscale Methodologies, June (2006).

"Computing the Zeros of Truncated Fourier Series and Chebyshev Polynomial Series: Roots of Polynomials in Spectral Form", SIAM National Meeting, Boston, July (2006).

"Gibbs Phenomenon and the Runge Phenomenon: New Strategies to Defeat Old Adversaries", SIAM National Meeting, Boston, July (2006).

" Radial basis function and rational Chebyshev algorithms for solving nonlinear wave equations", IMACS Waves, Athens, Georgia, April (2007)

"Exponentially Convergent Ways to Defeat the Runge Phenomenon for Non-periodic Functions on an Evenly Spaced Grid with Applications to Gibbs Phenomenon", ICOSAHOM, Beijing, June (2007).

"Gaussian Radial Basis Functions: Cardinal Functions, the Error Alpha-Plateau, Fast Transforms, and Spatially-Adaptive Weather Forecasting on the Sphere", ICOSAHOM, Beijing, June (2007).

"Adaptive Radial Basis Function Methods", Nonlinear Waves--Theory and Applications Conference, Tsinghua University, Beijing, June 11 (2008)

"Mathematical Challenges in Climate Modeling and Weather Forecasting", plenary address, SIAM Annual Meeting, July 11, San Diego (2008)

"Adaptive Radial Basis Functions for Vortex Flows on the Sphere", SIAM Annual Meeting, July 11, San Diego (2008)

"Vortex-RBF Methods on the Sphere", with Lei Wang, SIAM CSE, Orlando, March (2009)

" The Corner Wave Bifurcation in Atmospheric and Oceanic Kelvin Waves",

IMACS Nonlinear Waves Conf., Athens, Georgia, March 23 (2009).

"Adaptive Radial basis function algorithm for the the Benjamin-Ono equation", IMACS Nonlinear Waves Conf., Athens, Georgia, March 24 (2009).

" Radial Basis Function Spectral Methods and Their Application to Flow on a Sphere and Nonlinear Wave Equations", SIAM Regional Meeting, Wayne State University, Detroit, Michigan, 16 April (2009).

" Challenges and Controversies in Multiscale Numerical Algorithms for Weather Forecasting and Climate Modeling", ICOSAHOM, Trondheim, Norway , 22 June (2009)

"Adaptive radial basis function algorithm for the Benjamin-Ono equation", ICOSAHOM, Trondheim, Norway , 23 June (2009)

" Vortex-RBF Methods on the Surface of a Sphere", ICOSAHOM, Trondheim, Norway , 24 June (2009)

" A Vortex/Radial Basis Function Algorithm for the Barotropic Vorticity Equation on a Rotating Sphere", Frontiers of Geophysical Simulation Workshop, NCAR, August 19, 2009

"Vortex/RBF methods", SIAM National Meeting, July, 2010

"Exploiting Symmetry in Spectral Methods", SIAM National Meeting, July, 2010

"Strategies to Defeat Runge and Gibbs Phenomena", SIAM National Meeting, July, 2010

"Recent Progress in Radial Basis Functions", SIAM Conference on Computational Science & Engineering, Reno, March, 2011

"Comparison of Three Spectral Methods for the Benjamin-Ono Equation: Fourier pseudospectral, rational Christov functions and Gaussian radial basis functions", IMACS Waves Conference, Athens, Georgia, April, 2011

"Rossby solitary waves embedded in equatorial jets",American Meteorological Society's 18th Conference on Atmospheric and Oceanic Fluid Dynamics Spokane, WA 13-17 June, 2011

Invited participant in NSF/SIAM Workshop, "Forward Looking Workshop for Mathematical Geosciences", Crystal City, DC, Sept. 16-17 (2011)

"Identity Issues in Radial Basis Functions: RBFs as Modulated Sinc Functions in the Near-Equivalence of Exponentially Convergent RBF Species", SIAM National Meeting, Minneapolis, July 8, 2012

"Two studies of generalized Benjamin-Ono equations: Pad\'{e}-perturbative continuation for solitary waves and comparisons of three spectral algorithms for the general initial-value problem", Nonlinear Waves in Fluids, Loughborough University, Sept. 12, 2012

"Chebyshevization of Algebraic Geometry", Chebfun Workshop, Oxford University, Sept 19, 2012

"Progress in Radial Basis Function Methods:
Adaptive Vortex-RBF Methods for the Sphere and Other Advances", PDEs on the Sphere, Cambridge University, Sept. 26, 2012

."Radial Basis Function (RBF) Approximation Is Indistinguishable From Hermite Function Interpolation on a Finite Interval: RBFs Without Matrix Inversion", SIAM Natiional Meeting, San Diego, July 8 (2013)

"Are Spectrally-Accurate Radial Basis Functions Obsolete? Gaussian-Mollified Polynomial Interpolation", SIAM Annual Meetng, Chicago, July 11 (2014)

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Seminars

"Equatorial solitary waves", Scripps, June, 1977

"The effects of latitudinal shear on equatorial waves", Nova University, April, 1978

"The effects of latitudinal shear on equatorial waves", Florida State University, April, 1978

"Recent progress in equatorial waves", GFDL, Princeton, February, 1979

"Nonlinear equatorial waves", University of Chicago, March, 1979

"Nonlinear equatorial waves", Harvard, February, 1980

"The general circulation of the atmosphere", Raytheon Corp., Waltham, April, 1980

"Equatorial solitary waves", MIT, November, 1980

"Nonlinear equatorial gravity waves", Harvard, December, 1980

"Nonlinear equatorial waves", GFDL, Princeton, May, 1985

"Algebraic manipulation languages in fluid mechanics", AOS Dept., Ann Arbor, March, 1986

"Orthogonal rational functions on unbounded intervals", NOAA GFDL & Applied Mathematics Program, Princeton, June, 1986

"Algebraic manipulation languages in fluid mechanics", Laboratory for Scientific Computation, April, 1987

"Special Chebyshev methods for corner singularities and non-local solitary waves", Ohio Supercomputer Center, February, 1989

"Special Chebyshev methods for corner singularities and non-local solitary waves", Laboratory for Scientific Computation, March, 1989

"New directions in nonlinear waves", Univ. of South Carolina, November, 1989.

"New directions in nonlinear waves", AOSS Dept., February, 1990.

"Weakly nonlocal solitary waves", Dept. of Mech. & Aerospace Engineering, Rutgers, December, 1991

"The energy spectrum of fronts", GFDL/Princeton, March, 1992

"New directions in numerical oceanography", Hawaii, April, 1992

"Weakly nonlocal solitary waves", JIMAR, U. Hawaii, Oct., 1992

"The energy spectrum of fronts", Dept. Meteorology, U. Hawaii, Oct., 1992

"Weakly nonlocal solitary waves", University of New South Wales, Oct., 1992

"Weakly nonlocal solitary waves", Monash University, Nov., 1992

"Equatorial Solitary Waves", U. of Delaware, Dec., 1994

"Nonlocal solitary waves and near-equatorial vortices", U. of Hawaii, June, 1997

"Nonlocal solitary waves and near-equatorial vortices", Peking University, Beijing, June, 1997

"Nonexistence of non-axisymmetric solitary waves and vortex crystals", Key Laboratory for the Atmospheric Boundary Layer, Academica Sinica, Beijing, June, 1997

"Nonlocal solitary waves and near-equatorial vortices", Ocean University of Qingdao, June, 1997

"Nonlocal solitary waves and near-equatorial vortices", Nanjing University, June, 1997

"Nonlocal solitary waves and near-equatorial vortices", Pacific Marine Environmental Laboratory, Seattle, June, 1997

"Solitary waves by horseback, matched asymptotic expansions, and computer algebra", AOSS Dept., Michigan, October, 1999

"Periodic extension of non-periodic functions and the optimization of smoothed, C-infinity top-hat function", Computer Science Dept., University of Toronto, Jan. 26,2001

"Compatibility Conditions for Time-Dependent Partial Differential Equations and the Rate of Convergence of Chebyshev and Fourier Spectral Methods", Wayne State University, Sept. 17, 2001.

"Step-Fronts and Spiriform Filaments: Why Computational Meteorology is Hard", AOSS Dept., October 4, 2001

"Prolate Spectral Elements", Division of Applied Mathematics, Brown University, Oct. 15, 2002

"Prolate Spectral Elements", Dept. of Mathematics, Michigan State University, Nov. 5, 2002

"Prolate Spectral Elements", Dept. of Math., U. of Michigan, April 18, 2003

"Geophysical Fluid Dynamics", AOSS Dept., REU, June, 2005

"Equatorial Rossby Solitons", Dept. of Atmospheric Science, Peking U., June 23, 2005

"Equatorial Kelvin and Rossby Waves", Ocean University of China, Qingdao, June 27, 2005

"Equatorial Kelvin Fronts and Microbreaking", Institute of Atmospheric Physics, Academica Sinica, Beijing, June 29, 2005

"A History of the Kelvin Wave", AOSS Dept, Univ. of Michigan, November, 2006

"Defeating the Runge Phenomenon", Applied Math. Dept., Univ. of Colorado, November, 2006.

"Nonlinear Kelvin Waves", NCAR, November, 2006.

"Gaussian Radial Basis Functions", Dept. of Mathematics, University of Michigan, Feb. 2, 2007.

"Kelvin Waves", Peking University, June, 2007

"Kelvin Waves", Academic Sinica, Key Laboratory for Mesoscale Meteorology, Beijing, June, 2007

"Corner Waves", Peking University, June, 2008

"Adaptive RBF Methods", Academic Sinica, Key Laboratory for Mesoscale Meteorology,

Beijing, June, 2008

"Global Spectral Methods for Non-Tensor Geometry", Dept. of Physics, University of Colima, Colima, Mexico, Oct. 22, 2010

" The Gibbs and Runge Phenomena in Approximation Using Samples on a Uniform Grid: Remedies, Limits and Open Questions", Applied & Interdisciplinary Mathematics", Univ. of Michigan, April, 2011

""Hermite Functioin Interpolation on a Finite Interval and the Interrelationships of Polynomial and Radial Basis Functions', Applied & Interdisciplinary Mathematics", Univ. of Michigan, March, 2013

"Expanding Chebyshev Polynomial Technology to Bivariate Algebraic Geometry: Division, Resultants, Contours and Roots", Texas A & M, March 2013

"Two Studies of Generalized Benjamin-Ono Equations: Pade-perturbative Continuation for Solitary Waves and Compariisons of Three Spectral Algorithms for the General Initial-Value Problem", Texas A & M, March 2013

"Hermite Functioin Interpolation on a Finite Interval and the Interrelationships of Polynomial and Radial Basis Functions", Texas A & M, March 2013

Frontiers in Mathematics is the premier lecture series in the Texas A&M University Department of Mathematics. Each year up to ten distinguished mathematicians are invited to visit the campus for a week, and to deliver series of lectures on current research. This also provides opportunities for interactions with our faculty and graduate students.

Educational Activities

Chairman of Ph. D. Theses:

1. Dr. Shun der Ko (graduated '85; co-chair, J. J. Tribbia)

2. Dr. Sue Ellen Haupt, NCAR (graduated '87)

3. Dr. Hong Ma (graduated '91)

4. Dr. Mark Schumack, Univ. Detroit-Mercy (graduated '90; co-chair, W. W. Schultz)

5. Dr. Javad Abdollahi-Alibeik, Lawrence Tech (graduated '94; co-chair, N. Katopodes)

6. Dr. Hengchu Han, automobile industry (graduated '95, co-chair, W. W. Schultz)

7. Dr. Beth Wingate, Los Alamos (graduated '96)

8. Dr. Wan-li Wu, NOAA (graduated '96, co-chair, A. K. Smith)

9. Dr. Guan-Yu Chen, National Sun Yat-Sen University, Kaohsiung City, Taiwan (graduated '98)

10. Dr. Natasha Flyer, NCAR (graduated '98)

11. Dr. Laila Guessous (graduated '99, co-chair, V. Arpaci)
Assoc. Prof., Oakland University

12. Dr. Andrei Natarov (graduated '00) The International Pacific Research Center (IPRC) at the University of Hawaii

13. Dr. Zhengjie Xu, Applied and Interdisciplinary Mathematics, (defended Aug '10), Bloomberg

14. Dr. Lei Wang, Applied and Interdisciplinary Mathematics (defended May '10), Asst. Prof., Wisconsin-Milwauekee

15. Dr. Cheng Zhou, Atmospheric Science, (defended Nov '09), Asst. Res. Sci, Michigan

16.Dr. Burhan Sadig, Applied and Interdisciplinary Mathematics (defended Sept '13),

17. Dr. Jianping Xiao, Atmospheric Science & Scientific Computing, (defended May, 2014)

(total of 17 Ph. D. students graduated)

Member of Ph. D. Committees:

1. Dr. Nam Young Lee MEAM (W. Schultz, Chairman)
2. Dr. Wen-Mei Yang MEAM (V. Arpaci, Chairman)
3. Dr. Randy Haupt ECEE (V. Liepa, Chairman)
4. Dr. Stephen Bougher AOSS (A. Nagy, Chairman)
5. Dr. James Leo AOSS (S. Jacobs, Chairman)
6. Dr. K.-H. Luc EECS (K. Irani, Chairman)
7. Dr. Amid Ansari AOSS/MEAM (R. Akhavan, Chairwoman)
8. Dr. Judith Miller Math (M. Weinstein, Chair)
9. Dr. Asghar Esmaeeli-Kosej MEAN (G. Tryggvason, Chair)
10. Dr. Andrew Cary Aero (K. Powell)
11. Dr. Sangmo Kang MEAM (R. Akhavan)
12. Dr. Robert Groves Nuclear E. (E. Larsen)
13. Dr. Brett Sanders CEE (N. Katopodes)
14. Dr. Joseph Schumer NE&RS (J. Holloway)
15. Dr. Zheng Xu AOSS (S. Jacobs)
17. Dr. Zhijian Wu AOSS (G. Meadows, Chair)
18. Dr. Srikanth Ranganathan AOSS (D. Ortland/P. Hays, Chairs)
19. Dr. Vivian Choi Mathematics, Monash Uninversity (R. Grimshaw, chair)
20. Dr. Anita Tam Layton Computer Sci., U. of Toronto (K. Jackson, C. Christara, chairs)

21. Dr. Christiane Jablonowski, AOSS (J. Penner, Chair) 4/30/2004

22. Dr. Christopher Kent, NAME (W. Choi, Chair)

23. Dr. Jacquelin Koch, AOSS 8/18/2006 (N. Renno, Chair)

24. Dr. Mehmet Umut Haliloglu, ME, 5/20/2007 (R. Akhavan, Chair)

25. Hee Jun Park, ME, 5/18/2008 (R. Akhavan, Chair)

26. Mark Iwen, Mathematics, 7/8/2008 (Martin Strauss, Chair)

27. Christopher Subich, Applied Mathematics, University of Waterloo, 5/2/2011
Supervisor(s): Kevin Lamb and Marek Stastna

28. Alfredo Weitzel, AIM, in progress (Brian Arbic and Peter Miller, co chairs)

29. Andrew Morten, physics (Brian Arbic, chair)

30. Conrad Luecke, Earth & Environmental Sciences(Brian Arbic, chair)

Collaborated on articles with doctoral students, but not official advisor

Zaphiris Christidis

Nam Young Lee, (advisor, Bill Schultz)

Brett Sanders

Mehlika Nur Inanici, Art & Architecture Lighting Ph. D. (candidacy 2001, advisor, Prof. Mojtaba Navvab))

M. S. Degrees

1. Zaphiris Christidis ('83)

2. Xiaoming Zhang ('88)

3. Hao Xu ('04)