

CURRICULUM VITAE

KEITH A. JULIEN

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EDUCATION

UNIVERSITY OF CAMBRIDGE, ENGLAND

PH.D. Applied Mathematics and Theoretical Physics, 1991,
Dissertation Title: Strong Spatial Resonances in Convection.
Part III. Mathematics Tripos, Certificate in Advanced Studies, 1987.

KINGS COLLEGE, UNIVERSITY OF LONDON, ENGLAND

B.Sc. Joint Honors in Mathematics and Physics, 1986.
1ST Class Honors.

PROFESSIONAL EXPERIENCE

POSITIONS HELD

<i>July 2015 – Present</i>	Chair, Department of Applied Mathematics, University of Colorado, Boulder, Colorado, U.S.A.
<i>July 2008 – Present</i>	Professor, Department of Applied Mathematics, University of Colorado, Boulder, Colorado, U.S.A.
<i>June 2006 - May 2009</i>	Graduate Studies Chair, Department of Applied Mathematics, University of Colorado, Boulder, Colorado, U.S.A.
<i>July 2003 – June 2008</i>	Associate Professor, Department of Applied Mathematics, University of Colorado, Boulder, Colorado, U.S.A.
<i>Jan, 1998 - June 2003</i>	Assistant Professor, Department of Applied Mathematics, University of Colorado, Boulder, Colorado, U.S.A.
<i>Jan, 1997 – Dec. 1997</i>	Instructor, Department of Applied Mathematics. University of Colorado, Boulder, Colorado, U.S.A.
<i>Oct, 1994 – Sept. 1996</i>	Advanced Study Postdoctoral Fellowship, National Center for Atmospheric Research (NCAR), Colorado, U.S.A.
<i>May 1991 – Sept. 1994</i>	Postdoctoral Research Associate, Joint Institute for Laboratory Institute (JILA), Colorado, U.S.A.

GRADUATE AND POSTDOCTORAL ADVISORS

Professor Michael R. E. Proctor, Department of Applied Mathematics and Theoretical Physics,
Fellow of the Royal Society University of Cambridge, England

Professor James C. McWilliams, Institute of Geophysics and Planetary Physics and Department of
National Academy of Sciences Atmospheric Sciences, University of California at Los Angeles

Professor Juri Toomre,

JILA and Department of Astrophysical and Planetary Sciences,
University of Colorado at Boulder

ACADEMIC AWARDS/HONORS

- 1988, J. T. Knight Prize, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, England.
- 1998, Creative Research and Creative Works, Junior Faculty Development Award, University of Colorado at Boulder.
- 2004, Creative Research and Creative Works, Faculty Fellowship Award, University of Colorado at Boulder.
- 2007, Innovative Seed Grant, University of Colorado at Boulder.
- 2017 Fellow of American Physical Society, Division of Fluid Dynamics
- 2020 Kirk Distinguished Fellowship, Isaac Newton Institute, University of Cambridge (Postponed due to COVID until 2022).
- 2021 Principal Lecturer, Geophysical Fluid Dynamics Summer Program, Woods Hole Oceanographic Institute.

RESEARCH INTERESTS

- Geophysical and Astrophysical Fluid Dynamics
- Physical Applied Mathematics
- Computational Fluid Dynamics
- Turbulent Fluid Convection
- Theory of Mixing and Transport
- Dynamical Systems Theory

PROFESSIONAL ACTIVITIES

<i>Feb. 2019 – July 2019</i>	Committee of Visitors for External evaluation of the Division of Ocean Sciences, National Science Foundation
<i>Jan. 2017 – June 2018</i>	Co-organizer, Lorentz Center, International Center for Scientific Workshops. May 28-June 1. Workshop on “Rotating Convection: Experiments, Simulations and Theory.”
<i>Feb. 2015 – July 2015</i>	Committee of Visitors for External evaluation of the Division of Ocean Sciences, National Science Foundation
<i>Oct. 2014 – present</i>	Associate Editor, Nonlinearity. Publisher IOP.
<i>Oct. 2012 – Dec. 2014</i>	Co-organizer, Institute for Pure And Applied Mathematics (IPAM) 14 week Long Program on “The Mathematics of Turbulence,” Fall 2014 (UCLA), California, U.S.A.
<i>Jan. 2011 – July 2012</i>	Theme-of-the-Year Co-Director, NCAR/IMAGE (Institute for Mathematics Applied to the Geosciences), Boulder, Colorado, U.S.A.
<i>Jan. 2007 – July 2008</i>	Theme-of-the-Year Co-Director, NCAR/IMAGE (Institute for Mathematics Applied to the Geosciences),

PROFESSIONAL SOCIETIES MEMBERSHIP

- American Physical Society (APS), 1991-Present
- Society of Industrial and Applied Mathematics (SIAM), 1996-Present
- American Geophysical Union (AGU), 2008-Present

REVIEWER

- Chaos
- Dynamics of Atmospheres and Oceans
- Geophysical and Astrophysical Fluid Dynamics
- European Journal of Fluid Mechanics
- Journal of Fluid Dynamics Research
- Journal of Fluid Mechanics
- Journal of Marine Research
- Journal of Physical Oceanography
- Journal of Theoretical and Computational Fluid Dynamics
- National Science Foundation
- National Aeronautics and Space Administration
- New Journal of Physics
- Nonlinearity
- Physics of Fluids
- Physical Review Fluids
- Physical Review Letters
- Proceedings of the Royal Society of London
- Solar Physics
- Theoretical and Computational Fluid Mechanics

PANELS

- Solar Research and Theory Program, National Aeronautics and Space Administration, Feb. 2000.
- Solar Heliospheric and Physics Program, National Aeronautics and Space Administration, Feb. 2004.
- High Performance Computing Acquisition Program for Track 2 system grants, National Science Foundation, April 25-27, 2006.
- Solar Heliospheric and Physics Program, National Aeronautics and Space Administration, April 2006.
- Physical Oceanography Program, National Science Foundation, November 2008
- Applied Mathematics, Fluids and Geosciences, National Science Foundation, March 2013.

SESSION CHAIR

- Solar Convection and Oscillations and Their Relationship, Aarhus, Denmark, May, 1994.
- International Conference on nonlinear waves, Integrable Systems and Applications, University of Colorado at Colorado Springs, June 2005
- Minisymposium on reduced models for geophysical flows at Society for Industrial and Applied Mathematics Conference on Nonlinear Waves and Coherent Structures, Seattle, 2006.
- Rotating Flows session at the Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Salt Lake, November 20-22, 2007.

- The Fluid Dynamics of Planets and Stars I. American Geophysical Union, Fall Meeting San Francisco, December 2012.

MEETING ORGANIZER

- Minisymposium on reduced models for geophysical flows at Society for Industrial and Applied Mathematics Conference on Nonlinear Waves and Coherent Structures, Seattle, 2006.
- NCAR/IMAGE 2008 Theme-Of-the-Year Workshop II on Geophysical Turbulent Phenomena; Theory and Modeling, Boulder, February 2008.
- NCAR/IMAGE 2008 Theme-Of-the-Year Workshop III on Geophysical Turbulent Phenomena; Towards Petascale Computing, Boulder, May 2008.
- CU & NCAR/IMAGE 2008 Theme-Of-the-Year Summer School on Geophysical Turbulent Phenomena, Boulder, July 2008 (Three weeks).
- CU & NCAR/IMAGE 2012 Theme-Of-the-Year Program on Rotating Stratified Flows.
- Convener - The Fluid Dynamics of Planets and Stars I. American Geophysical Union, Fall Meeting San Francisco, December 2012.
- UCLA/IPAM 2014 Long Program on 'The Mathematics of Turbulence.'
- Lorentz Center, Netherlands, 2018 Workshop on Rotating Convection.

COMMITTEES

COLLEGE

- Engineering Excellence Fund, 1998-2002.
- Arts and Sciences Committee, 2002-2008.
- Arts and Sciences Budget Committee, 2002-2009.
- Dean Search Committee, 2011-2012
- Arts and Sciences Tenure and Promotions Committee, 2012 –2015
- Aerospace Ventures Committee Member, 2015-2018
- Chancellors Committee on Inclusive Excellence and Diversity 2017.
- Arts and Sciences Program fees Working Group, 2019-2019.
- Chancellors Postdoctoral Fellows Review Panel for AY 2017-2019.

DEPARTMENTAL

- Undergraduate Committee, 1998-2002.
- Faculty Search Committee, Dynamics, 2001-2002.
- Faculty Search Committee, Math/Bio, 2005.
- Departmental Computer and Integrated Technologies Committee, 2005.
- Ad-hoc Departmental Computer and Integrated Technologies Committee, 2005.
- Graduate Committee, 2005-2008.
- Faculty Search Committee, Statistics, 2009.
- Primary Unit Evaluation Committee I, Chair 2009.
- Primary Unit Evaluation Committee II, 2009.
- Primary Unit Evaluation Committee, Chair 2012.
- Executive Committee, 2013-2015.
- Faculty Search Committee and Chair, Nonlinear Mathematics, 2013.
- Ad-hoc Committee Member and Chair – School of Mathematics, 2013.
- Ad-hoc Committee Member and Chair – White Paper on APPM Space, 2013.
- Faculty Search Committee, Chair, Mathematical Geosciences and Math. Biology, 2014.
- Faculty Search Committee, Chair, Stochastic Applications, 2015.
- Committee Member, BA degree proposal on Statistics and Data Science, 2016.

FUNDED RESEARCH

EXTERNAL FUNDING (All dollar contributions are for CU)

- Penetrative Convection in the Solar Interior (with Werne, J., NorthWest Research Associates), Principal Investigator, National Aeronautics and Space Administration, Solar Physics and Theory, Sun-Earth Connections Program, Grant No NAG5-4918, \$237,000, 1997-2000.
- Mathematical Sciences Scientific Research Environments (with Curry J., CU), Co-Principal Investigator, National Science Foundation, Division of Mathematical Sciences, Infrastructure Program, Grant No DMS-9870962, \$35,068, 1998-2000.
- Solar-Terrestrial and Convective Plume Dynamics, Stability, and Gravity Wave Excitation in the Solar Tachocline (with Fritts, D., NorthWest Research Associates), Co-Principal Investigator, National Science Foundation, Division of Atmospheric Sciences Program, Grant No ATM-9811938, \$35,593, 1998-2001.
- Magneto-Hydrodynamic Instability and Turbulence in the Solar Tachocline (with Werne, J., Cattaneo, F., NorthWest Research Associates & University of Chicago), Co-Principal Investigator, National Aeronautics and Space Administration, Solar Physics and Theory, Sun-Earth Connections Program, Grant No MASW-99026, \$35,593, 1999-2002.
- Rotationally Constrained Convection: Investigations of a New Class of Reduced Equations, Principal Investigator, National Science Foundation, Division of Ocean Sciences, Physical Oceanography Program, Grant No OCE-0137347, \$173,995, 2002-2005.
- Advanced Technology Platforms- Itanium2™ 2003 Academic Grant Initiative, Co-Principal Investigator (with Connors, D.), Hewlett Packard Gift No. 89932, \$153,310, 2003.
- Modeling Magneto-Inertial-Gravity Waves in the Lower Convection Zone (with Werne, J., NorthWest Research Associates), Principal Investigator, National Aeronautics and Space Administration, Solar Heliospheric and Physics Program, Grant No NNG05GD37G, \$400,226, 2005-2008.
- Community Hounds and Hares Exercises in Local Helioseismology (with Werne, J., NorthWest Research Associates), Co-Principal Investigator, National Aeronautics and Space Administration, Living with a Star Guest Investigator Program, Grant No NNH04CC056, \$144,738, 2005-2008.
- EMSW21-MCTP: Colorado Advantage (with Curry J.H., CU), Co-Principal Investigator, National Science Foundation, Division of Mathematical Sciences, Workforce in the Mathematical Sciences Program, Grant No DMS-0602284, \$783,081, 2005-2008.
- Summer School on Geophysical Turbulent Phenomena, Principal Investigator, National Science Foundation, Division of Mathematical Sciences, Opportunities for Research Collaborations between the Mathematical Sciences and Geosciences, Grant No DMS-0724859, \$109,367, 2007-2008.
- Langmuir Circulations: Observing and Modeling on a Global Scale, Co-Principal Investigator (with Fox-Kemper, B., CU), National Aeronautics and Space Administration. \$777,196, 2009-2012.
- Focused Research Group: Models of Balanced Multiscale Ocean Physics for Simulation and Parameterization, Principal Investigator, National Science Foundation. Grant No DMS 0855010, \$805,415, 2009-2012.
- Collaborations in the Mathematical Geosciences: Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Ocean Mixed Layer, Co-Principal Investigator (with Chini, G., University of New Hampshire) National Science Foundation. \$520,788, 2009-2013
- Collaborative Studies of the Earth's Deep Interior: Next Generation Modeling of Core Turbulence via Combined Laboratory, Numerical and Theoretical Models (with Jon Aurnou, UCLA) National Science Foundation. \$423,778, 2011-2014

- Collaborative Research: Next Generation Modeling of the Geodynamo: Development of the First Multiscale Dynamo Model Co-Principal Investigator (with Aurnou J., UCLA) National Science Foundation. \$540,000, 2013-2016
- Collaborative Research: Formation, Properties and Evolution of Protoplanetary Vortices: Multiscale Investigations of Baroclinic Instabilities. Co-Principal Investigator (with Knobloch, E. UC Berkeley) National Science Foundation. \$370,000, 2013-2016.
- Collaborative Research: Computational Infrastructure in the Geosciences. Co-Principal Investigator (for support of Post-Doctoral Researcher, Featherstone) National Science Foundation. 2013-2016.
- Collaborative Research: Synergistic Explorations of Hydromagnetic Core Turbulence via Simulations and Asymptotics. Co-Principal Investigator (with Calkins, M. CU) National Science Foundation. \$573,000, 2016-2020.
- Collaborative Research: Computational Infrastructure in the Geosciences. Co-Principal Investigator (for support of Post-Doctoral Researcher, Featherstone) National Science Foundation. 2016-2021.
- Collaborative Research. Explorations of Salt Finger Convection in the Extreme Oceanic Regime: An Asymptotic Modeling Approach. Principal Investigator (Co. PI Knobloch, E. UC Berkeley) National Science Foundation, Physical Oceanography. \$363,735, 2020-2023.
- Collaborative Research. Inverse Cascade Pathways in Turbulent Convection – The Impact of Spatial Anisotropy. Principal Investigator (Co. PI Knobloch, E. UC Berkeley) National Science Foundation, DMS \$194,117, 2020-2023.

INTERNAL FUNDING

- Derivation and Investigations of a New Class of Equations for Rotationally Constrained Flows, Principal Investigator, University of Colorado, Creative Research and Creative Works, Junior Faculty Development Award, \$5,000, 1998.
- Reduced Modeling of Geophysical and Astrophysical Fluid Flows, Principal Investigator, University of Colorado, Creative Research and Creative Works, Faculty Fellowship Award, \$5,000, 2004.
- Multi-scale Modeling and Simulation in the Geosciences: Towards Petascale Computing, Principal Investigator, University of Colorado, Innovative Seed Grant, \$50,000, 2007.
- Exploring Doubly-Diffusive Turbulence in Extreme Environments, Principal Investigator, University of Colorado, Innovative Seed Grant, \$50,000, 2019.

FUNDED RESEARCH SUPERCOMPUTING RESOURCES

- Coherent Structures and Statistical Dynamics of Rotating, Stratified Turbulence at Large Reynolds Number, Co-Principal Investigator, National Science Foundation Metacenter Award, 1997-1998,
Allocation Amount: 188,900 SU's,
Supercomputers and Centers: Cray T3E, C90, and SGI Origin at Pittsburgh and San Diego
- Convective Plume Dynamics, Stability, and Gravity Wave Excitation in the Solar Tachocline, Co-Principal Investigator, National Science Foundation Metacenter Award, 1998-1999,
Allocation Amount: 30,000 SU's,
Supercomputers and Centers: Crays T3E and C90 at San Diego
- Penetrative Dynamics of the the Solar Interior, Principal Investigator, National Partnership for Advanced Computational Infrastructure, 1998-1999,

Allocation Amount: 25,000 SU's,
Supercomputers and Centers: Crays T3E at San Diego

- Magneto-hydrodynamic Instability and Turbulence in the Tachocline, Principal Investigator, National Partnership for Advanced Computational Infrastructure, 2001-2002, Allocation Amount: 25,000 SU's, Supercomputers and Centers: Crays T3E at San Diego
- Multi-Scale Modeling and Computation of Convective Geophysical Turbulence, Principal Investigator, National Aeronautics and Space Administration, Leadership Computer Systems, 2007-2012, Allocation Amount: 1,250,000 SU's, Supercomputers and Centers: SGI Altix at AMES Research Center
- Multi-Scale Modeling of Submesoscale Ocean Dynamics, Co-Principal Investigator, National Aeronautics and Space Administration, HEC, 2012-2013, Allocation Amount: 460,800 SU's, Supercomputers and Centers: SGI Altix at AMES Research Center
- University of Colorado at Boulder, Research Computing, 2012-2017, Allocation Amount: 1,200,000 SU's/per year Supercomputers and Centers: JANUS at Research Computing Center.
- Multi-Scale Asymptotic Simulations for Modeling Planetary Interiors, Principal Investigator, National Aeronautics and Space Administration, HEC, 2015-2016, Allocation Amount: 111,996 SU's, Supercomputers and Centers: Plaiedes at NASA Advanced Supercomputing Center
- Multi-Scale Asymptotic Simulations for Modeling Planetary Interiors, Principal Investigator, National Aeronautics and Space Administration, HEC, 2016-2017, Allocation Amount: 111,996 SU's, Supercomputers and Centers: Plaiedes at NASA Advanced Supercomputing Center

Note 1 Service Unit (SU) is equivalent to 1 CPU hour

EDUCATIONAL FUNDING

EXTERNAL FUNDING

- EMSW21-MCTP: Colorado Advantage (with Curry J.H.), Co-Principal Investigator, National Science Foundation, Division of Mathematical Sciences, Workforce in the Mathematical Sciences Program, Grant No DMS-0602284, \$783,081, 2005-2008.
- Collaborative Research: Extreems-QED: Direction in Data Discovery (Data Cubed) in Undergraduate Co- Investigator (PI, Anne Dougherty, CU) National Science Foundation. \$949,674, 2014-2019.

INTERNAL FUNDING

- Computational and Mathematical Tools for Differential Equations on the World-Wide-Web, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder, \$19,000, 1998.
- Enhancement of the Undergraduate Computational Environment in Applied Mathematics, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder,

\$20,000, 2003.

- Development of an Undergraduate Data Visualization Toolkit in Applied Mathematics, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder, \$14,300, 2004.

REFEREED PUBLICATIONS

JOURNAL ARTICLES

1. Julien, K., "Strong spatial interactions with 1:1 resonance: A three-layer convection problem," **Nonlinearity**, 7, 1655-1693, (1994).
2. Julien, K., Legg, S., McWilliams J., and J. Werne, "Penetrative convection in rapidly rotating flows: preliminary results from numerical simulation," **Dynamics of Atmospheres and Oceans**, 24, 237-249, (1996).
3. Julien, K., Legg, S., McWilliams J., and J. Werne, "Rapidly rotating turbulent Rayleigh-Benard convection," **Journal of Fluid Mechanics**, 322, 243-273, (1996).
4. Julien, K., Legg, S., McWilliams J., and J. Werne, "Hard-turbulence in rotating Rayleigh-Benard convection: Preliminary results from numerical simulation," **Physical Review E**, 53, R5557-5560, (1996).
5. Bizon, C. A., Werne, J., Predtechensky, A., Julien, K., Mc Cormick, W. D., Swift, J. B., and H. L. Swinney, "Dynamics and scalings in quasi two-dimensional turbulent convection," **Physica A**, 239, 204-210, (1997).
6. Bizon, C. A., Predtechensky, A., Werne, J., Julien, K., Mc Cormick, W. D., Swift, J. B., and H. L. Swinney, "Plume dynamics in quasi 2D turbulent convection," **Chaos**, 7 (1), 107-123, (1997).
7. Julien, K. and E. Knobloch, "Fully nonlinear oscillatory convection in a rotating layer," **Physics of Fluids**, 9, 1906-1913, (1997).
8. Julien, K. and E. Knobloch, "Strongly nonlinear convection cells in a rapidly rotating fluid layer: The tilted f-plane," **Journal of Fluid Mechanics**, 360, 141-178, (1998).
9. Julien, K., Knobloch, E., and J. Werne, "A new class of equation for rotationally constrained flows," **Journal of Theoretical and Computational Fluid Dynamics**, 11, 251-261, (1998).
10. Balmforth, N., Casti, A., and K. Julien, "Thermohaline convection with nonlinear salt profiles," **Physics of Fluids**, 10, 819-828, (1998).
11. Julien, K. and E. Knobloch, "Fully nonlinear three-dimensional convection in a rapidly rotating layer," **Physics of Fluids**, 11, 1469-1483, (1999).
12. Julien, K., Legg, S., McWilliams J., and J. Werne, "Plumes in rotating convection. Part ensemble statistics and dynamical balances," **Journal of Fluid Mechanics**, 391, 151-187, (1999).
13. Julien K., Knobloch E. and S. M. Tobias, "Strongly nonlinear magnetoconvection in three-dimensions," **Physica D**, 128, 105-129, (1999).
14. Julien K., Knobloch E. and S. M. Tobias, "nonlinear magnetoconvection in the presence of strong oblique fields," **Journal of Fluid Mechanics**, 410, 285-322, (2000).
15. Rosenthal C.S. and K. Julien, "Numerical Modeling of the absorption and scattering of acoustic radiation by sunspots," **Astrophysical Journal**, 532:(2), 1230-1239, Part 1, (2000).
16. Abdulrahman A., Jones C.A., Proctor M.R.E., and K. Julien "Large wavenumber convection in the rotating annulus," **Geophysical and Astrophysical Fluid Dynamics**, 93: (3-4), 227-252, (2000).
17. Legg, S., Julien, K., McWilliams J., and J. Werne, "Vertical transport by convection plumes: Modification by rotation," **Physics and Chemistry of the Earth B**, 26, (4), 259-262, (2001).
18. Mullowney, P., Julien, K., and J.D. Meiss "Blinking rolls: Chaotic advection in a three-dimensional flow with an invariant," **Siam J. on Applied Dynamical Systems** 4, (1), 159-

- 186 (2005).
19. Ablowitz M. J., Julien, K., Musslimani, Z. H., and M. I. Weinstein “ Wave dynamics in optically modulated waveguide arrays,” **Physical Review E**,71, (055602) (4 pages) (2005)
 20. Knobloch, E., and K. Julien. “Saturation of the Magnetorotational instability” **Physics of Fluids**, 17 (9): Art. No. 094196 (6 pages) (2005).
 21. Petersen, M., Julien, K. and J.B. Weiss. “Vortex cores, strain cells, and filaments in quasi-geostrophic turbulence”, **Physics of Fluids**, 18 (2): Art. No. 026601(11 pages) (2006).
 22. Sprague*, M., Julien, K., Knobloch, E., and J. Werne. “Numerical simulations of an asymptotically reduced system for rotationally constrained convection,” **Journal of Fluid Mechanics**, 551, 141-174, (2006).
 23. Julien, K., Knobloch, E., R. Milliff and J. Werne. “Generalized quasigeostrophy for spatially anisotropic rotationally constrained flows,” **Journal of Fluid Mechanics**, 555, 233-274, (2006).
 24. Martinsen-Burrell, N., Julien, K., Petersen, M.R., and J.B. Weiss. “Merger and alignment in a reduced model for three-dimensional quasigeostrophic ellipsoidal vortices,” **Physics of Fluids**, 18 (5): Art. No. 057101 (14 pages) (2006).
 25. Julien, K. and E. Knobloch, “Saturation of the magnetorotational instability; Asymptotically exact theory,” In *Stellar Fluid Dynamics and Numerical Simulations: From the Sun to Neutron Stars*, M. Rieutord and B. Dubrulle (eds), **EAS Publications Series**, 21, 81-104, (2006). **Invited article.**
 26. Petersen, M., Julien, K. and G.R. Stewart. “Baroclinic vorticity production in protoplanetary disks. I. Vortex Formation,” **Astrophysical Journal**, 658 (2), 1236-1251, Part I (2007).
 27. Petersen, M., Stewart, G.R. and K. Julien, “Baroclinic vorticity production in protoplanetary disks. II. Vortex Growth and Longevity,” **Astrophysical Journal**, 658 (2), 1252-1265, Part I (2007).
 28. Julien, K. and E. Knobloch, “Reduced Models for Fluid flows with Strong Constraints,” **Journal of Mathematical Physics**, 48 (6): Art No. 065405 (34 pages), (2007). **Invited article.**
 29. Vasil G.M., Brummell N.H., and K. Julien, “[A new method for fast transforms in parity-mixed PDEs: Part II. Application to confined rotating convection](#),” **Journal of Computational Physics**, 227, Issue: 1, 8017-8034, (2008).
 30. Vasil G.M., Brummell NH, Julien K., “[A new method for fast transforms in parity-mixed PDEs: Part I. Numerical techniques and analysis](#),” **Journal of Computational Physics**, 227 Issue: 17, 7999-8016, (2008).
 31. Jamroz B., Julien K, Knobloch E., “[Saturation of the magnetorotational instability at large Elsasser number](#),” **Astronomische Nachrichten**, 329 Issue: 7, 675-687, (2008).
 32. Mullowney P., Julien K, Meiss JD, “[Chaotic advection and the emergence of tori in the Kuppers-Lortz state](#),” **CHAOS**, 18 Issue: 3 Art. No. 033104, (2008)
 33. Jamroz B., Julien K, Knobloch E., “[An asymptotically exact reduced PDE model for the magnetorotational instability: derivation and numerical simulations](#),” **Physica Scripta**, T132 Art No. 014027 (2008).
 34. Julien K., and M. Watson, “[Efficient multi-dimensional solution of PDEs using Chebyshev spectral methods](#),” **Journal of Computational Physics**, 228 Issue: 5, 1480-1503, (2009).
 35. Chini, G.P., Julien K., and E. Knobloch, “[An asymptotically reduced model of turbulent Langmuir circulation](#),” **Geophysical and Astrophysical Fluid Dynamics**, 103, Issue: 2-3, 179-197, (2009).
 36. Grooms, I., Julien, K., Weiss, J.B. and E. Knobloch, “Models of convective Taylor columns in rotating Rayleigh-Benard convection,” **Physical Review Letters**, 104, (22), 224501, (2010).
 37. Julien, K., and E. Knobloch, “Magnetorotational Instability: Recent developments,” **Philosophical Transaction of the Royal Society A: Mathematical, Physical and Engineering Sciences**, (368), issue 1916, 1606,1633, (2010)

38. Grooms, I., and Julien, K., “Linearly implicit methods for nonlinear PDE’s with linear dispersion and dissipation,” **Journal of Computational Physics**, 230 Issue: 9, 3630-3650, (2011).
39. Grooms, I., Julien, K., and B. Fox-Kemper,”On the interaction between planetary geostrophy and mesoscale eddies,” **Dynamics of Atmospheres and Oceans**, 51, Issue 3, 109-136, (2011).
40. *Calkins, M.A., Aurnou, J.M., Eldridge, J.D. and K. Julien, “The influence of fluid properties on the morphology of core turbulence and the geomagnetic field,” **Earth and Planetary Science Letters**, 259, 55-60, (2012).
41. Julien, K., *Rubio, .A., Grooms, I., and E. Knobloch, “Statistical and physical balances in low Rossby number Rayleigh-Benard convection.” **Geophysical and Astrophysical Fluid Dynamics**, 106 (4-5), 392-428, (2012).
42. Julien, K., Knobloch, E., *Rubio, .A., and G. Vasil, “Heat transport in low Rossby number Rayleigh-Benard convection,” **Physical Review Letters**, 254503 (2012).
43. *Calkins, M.A., Julien, K., and *P. Marti, “Three-dimensional quasi-geostrophic convection in the rotating cylindrical annulus with steeply sloping end walls,” **Journal of Fluid Mechanics**, 732, (4), 214-244, (2013).
44. *Malecha, Z., Chini, G.P., and K. Julien, “A multiscale algorithms for simulating spatially-extended Langmuir circulation Dynamics,” **Journal of Computational Physics**, 271, 131-150, (2013).
45. Stellmach, S., Lipscher, M., Julien, K., Vasil, G.M., Cheng, J.S., Ribeiro, A., King, E.M., and J. Aurnou, “Approaching the asymptotic regime of rapidly rotating convection: Boundary layer versus interior dynamics ,” **Physical Review Letters**, 113, (25), 224501, (2014).
46. *Beaume, C., Knobloch, E., Chini, G., and K. Julien, “Exact coherent structures in an asymptotically reduced description of parallel shear flows.” **Fluid Dynamics Research**, 47 (1) 015504 (2014).
47. Hamlington, P.E., Van Roekel, L.P., Fox-Kemper, B., Julien, K., and G. Chini, “Langmuir-submesoscale interactions: descriptive analysis of multiscale frontal spindown simulations,” **Journal of Physical Oceanography**, 44 (9) 2249-2271 (2014).
48. Nieves, D., *Rubio, A.M., and K. Julien, “Statistical classification of flow morphology in rapidly rotating Rayleigh-Benard convection,” **Physics of Fluids**, 26, (8), 086602, (2014).
49. *Rubio, A.M., Julien, K., Knobloch, E., and J.B. Weiss, “Upscale energy transfer in three-dimensional rapidly rotating turbulent convection,” **Physical Review Letters**, 112, (14), 144501, (2014).
50. Calkins, M.A., Hale, K., Julien, K., Nieves, D., Driggs, D. and P. Marti, “The asymptotic equivalence of fixed heat flux and fixed temperature thermal boundary conditions for rapidly rotating convection,” **Journal of Fluid Mechanics**, 784, R2, (2015).
51. Haney, S., Fox-Kemper, B., K., Julien, K., and A. Webb, “Symmetric and geostrophic instabilities in the wave-forced ocean mixed layer,” **Journal of Physical Oceanography**, 45, (12), 3033-3056, (2015).
52. *Calkins, M.A., Julien, K., Tobias, S.M., and J. Aurnou, “A multiscale dynamo model driven by quasi-geostrophic convection,” **Journal of Fluid Mechanics**, 780, 143-166, (2015).
53. Aurnou, J., *Calkins, M.A., Cheng, J., Julien, King, E.M., Nieves, D., Soderlund, K.M., and S. Stellmach, “Rotating convective turbulence in Earth and planetary cores,” **Physics of the Earth and Planetary Interiors**, 246, 52-71, (2015).
54. *Calkins, M.A., Julien, K., and *P. Marti, “Onset of rotating and non-rotating convection in compressible and anelastic ideal gases,” **Geophysical and Astrophysical Fluid Dynamics**, 109, (4), 422-449, (2015).
55. *Beaume, C., Chini, G.P., Julien, K., and E. Knobloch “Reduced description of exact coherent states in parallel shear flows,” **Physical Review E**, 91, (4) 043010 (2015).
56. Zhang, Z., Chini, G.P., Julien, K., and E. Knobloch “Dynamics patterns in the reduced

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73. Aurnou, J. and K. Julien, "On the Reinterpretation of Magnetostrophic Dynamo Action," **Bulletin of the American Physical Society**, 62, (2017)..
74. Miquel, B, Julien, K., Featherstone, N. and P. Marti. "Equatorially Localized Convection in a Rapidly Rotating Shallow Spherical Shell," **Bulletin of the American Physical Society**, 62, (2017).
75. Maffei, S., Calkins, M., Julien, K. and P. Marti. "Multiscale Numerical Simulations of Magnetoconvection at Low Magnetic Prandtl and Rossby Numbers" **Bulletin of the American Physical Society**, 62, (2017).

76. Julien, K., Knobloch, E. and M. Plumley. "The Impact of Domain Aspect Ratio on the Inverse Cascade in Rotationally Constrained Convection," **Bulletin of the American Physical Society**, 62, (2017).
77. Plumley, M., Calkins, M.A., Julien, K. and S. Tobias, "A Single-Mode Study of a Quasigeostrophic Convection-Driven Dynamo Model," **American Geophysical Union**, Fall Meeting (2017).
78. Chini, G., Michel, G., Julien K., and C. Caulfield. "Exact Coherent States in a Quasi-Linear Model of Strongly Stratified Kolmogorov Flow," **Bulletin of the American Physical Society**, 63, (2017).
79. Plumley, M., Calkins, M.A., Julien, K. and S. Tobias, "Magnetically Guided Jets and Dynamo Cycles in Simulations within a Planetary-like Parameter Regime," **American Geophysical Union**, Fall Meeting (2018).
80. Yan, M., Calkins, M.A., Maffei, S., Julien, K., Tobias, S. and P. Marti, "Thermal Convection with a Strong Vertical Magnetic Field," **American Geophysical Union**, Fall Meeting (2018).
81. Maffei, S., Calkins, M.A., Julien, K. and P. Marti, "Heat Transfer in Rapidly Rotating Magnetoconvection at Low Magnetic Prandtl and Rossby Numbers," **American Geophysical Union**, Fall Meeting (2018).
82. Invited Talk: Asymptotic Strategies for Modeling Geophysical and Astrophysical flows. Perspectives in Nonlinear Science, Institut d'Études Scientifiques de Cargèse. (2018)
83. Aurnou, J.M., Horn, S., and K. Julien, "Free-Fall estimates for rapidly rotating heat and momentum transport," **Bulletin of the American Physical Society**, 65, (2019).
84. Yan, M., Calkins, M.A., *Maffei, S., Julien, K., Tobias, S.M., and P. Marti, "The influence of magnetic Prandtl number on magnetoconvection," **American Geophysical Union**, Fall Meeting (2019).

PRESENTATIONS

INVITED TALKS:

1. September 2020, University of Houston, Mechanical Engineering Colloquium (Remote due to the COVID-19 pandemic), "Asymptotic Strategies for Modeling Geophysical and Astrophysical Convective flows."
2. July 2019, Waves Instabilities and Turbulence in Geophysical and Astrophysical Fluids (WITGAF), Institut d'Études Scientifiques de Cargèse, "Quasi-Geostrophic Theory: From Stratified to Unstably-Stratified Flows."
3. July 2019, Festival de la Théorie, Aix-en-Provence, "Asymptotic Strategies for Modeling Geophysical and Astrophysical Convective flows."
4. June 2019, CEA, Paris France, "Systematic derivations of the reduced equations for rapidly rotating convection."
5. June 2019, CEA, Paris France, "Asymptotic Strategies for Modeling Geophysical and Astrophysical Convective flows."
6. March 2018, Perspectives in Nonlinear Science, Institut d'Études Scientifiques de Cargèse. "Asymptotic Strategies for Modeling Geophysical and Astrophysical flows."

7. June 2017, Rocky Mountain PDE's Workshop, Brigham Young University: Turbulence and the Climate System. "Reduced PDE Models for Anisotropic Constrained Fluid Flows."
8. April 2017, Workshop on Atmospheric and Boundary layer flows, Kavli Institute for Theoretical Physics: Turbulence and the Climate System. "Investigations of rapidly rotating, stably stratified and non-hydrostatic flows."
9. March 2017, Applied Mathematics Colloquium, University of Colorado At Boulder: Turbulence and the Climate System. "Asymptotic Strategies for Modeling Geophysical and Astrophysical Flows."
10. August 2016, National Center for Atmospheric Research, Workshop: Turbulence and the Climate System. "The Effects of Ekman Pumping on Quasigeostrophic Rayleigh-Benard Convection."
11. July 2016, Workshop on Multiscale Interactions in Geophysical Fluid Dynamics. MFO Oberwolfach, Germany. "The Effects of Ekman Pumping on Quasigeostrophic Rayleigh-Benard Convection."
12. November 2015, University of New Hampshire/Institute of Applied Mathematics Workshop on Advancing Wall-Turbulence Model Development and Implementation. "Tutorial on Multiscale Asymptotics for Constrained Flows."
13. May 2015, University of Madison, Wisconsin. SF Research Training Group Workshop on Turbulent and Coherent Structures, "Attacking Low Rossby Number Convective Flows via Asymptotics, Simulations and Experiments."
14. November 2014, University of California at San Diego. Fluids Seminar, Mechanical Engineering, "Approaching the Asymptotic Regime of Rapidly Rotating Convection via Asymptotics, Simulations and Experiments."
15. October 2014, University of California at Los Angeles. Seminar, Earth and Planetary Sciences, "Approaching the Asymptotic Regime of Rapidly Rotating Convection: Boundary Layers vs Interior Dynamics."
16. October 2014, University of California at Los Angeles, Institute for Pure and Applied Mathematics, Long Program on the Mathematics of Turbulence. Workshop III, Geophysical and Astrophysical Turbulence "Approaching the Asymptotic Regime of Rapidly Rotating Convection: Boundary Layers vs Interior Dynamics."
17. September 2014, University of California at Los Angeles, Institute for Pure and Applied Mathematics, Long Program on the Mathematics of Turbulence, "Tutorial Lecture; Geophysical and Astrophysical Turbulence I."
18. November 2013, University of New Hampshire, Boundary Layer Workshop. "Modeling and Simulation in Rotationally Constrained (Convective) Flows."
19. September 2013, UCLA, Connecting Theory to Experiments in GAFD, "Rotationally Constrained Flows. A Review of Quasi-Geostrophy and its Applications."
20. July 2013, Geophysical Fluid Dynamics Summer School, Woods Hole Oceanographic Institute, "A Three-dimensional Model for Quasi-Geostrophic Convection in the Rotating Cylindrical Annulus with Steeply Sloping Endwalls."
21. October 2012, University of Colorado at Colorado Springs, Applied Math Colloquium, "Convective Flows Under Strong Rotational Constraint."
22. July 2012, Geophysical Fluid Dynamics Summer School Seminar, Woods Hole Oceanographic Institute, "Derivations of the Quasigeostrophic Equations under differing Aspect Ratio"
23. July 2012, 9th American Institute for Mathematical Sciences Conference, Florida, "Low Rossby number Heat Transport in Rayleigh-Benard Convection"
24. May 2011, University of New Hampshire, Applied Mathematics Program, "The NonHydrostatic Balanced Geostrophic Equations: The interplay between convection and barotropic dynamics."
25. July 2011, Geophysical Fluid Dynamics Summer School, Woods Hole Oceanographic Institute, "The NonHydrostatic Balanced Geostrophic Equations: The interplay between convection and barotropic dynamics."
26. July 2011, University of Toronto, Canadian Institute for Theoretical Astrophysics, "The NonHydrostatic Balanced Geostrophic Equations."
27. November 2010, University of Michigan, Applied Mathematics Colloquium, "Convective Flows"

- under Strong Rotational Constraint.”
28. November 2010, University of Michigan, Complex Systems Seminar, “Reduced Models for Astrophysical Accretion Disks.”
 29. September 2010, Institut D’Etudes Scientifiques de Cargese, France. Workshop on Convection, Magnetoconvection and Dynamo Theory, “The NonHydrostatic Balanced Geostrophic Equations.”
 30. October 2010, New York University, Courant Institute, “The NonHydrostatic Balanced Geostrophic Equations: From Rayleigh-Benard towards Penetrative Convection.”
 31. August 2010, National Center for Atmospheric Turbulence, Workshop on Rotating and Stratified Turbulence, “The NonHydrostatic Balanced Geostrophic Equations.”
 32. April 2010, University of California at Los Angeles, Earth Sciences Spinlab Seminar I &II, “Derivations of Asymptotically Reduced Equations in Rotating Cylindrical and Spherical Geometries.”
 33. March 2010, University of California at Los Angeles, Institute for Pure and Applied Mathematics. Long Program on Model and Data Hierarchies for Simulating and Understanding Climate, Workshop 1: Equation Hierarchies in Climate Modeling, “The NonHydrostatic Balanced Geostrophic Equations.”
 34. October 2009, Atmospheres and Oceans, University of Colorado, Graduate Seminar Series, “The NonHydrostatic Balanced Geostrophic Equations: Rotationally Constrained Rayleigh-Benard Convection.”
 35. April 2009, University of California at Santa Cruz, Applied Mathematics Colloquium, “Reduced Modeling of the MagnetoRotational Instability.”
 36. July 2008, NCAR/IMAGE Theme-Of-the-Year Summer School Geophysical Turbulent Phenomena, “Lecture Series on Reduced Models for Fluid Flows with Strong Constraints.”
 37. May 2008, NCAR/IMAGE Theme-Of-the-Year Geophysical Turbulent Phenomena. Workshop on Petascale Computing, “Numerical Simulations on Reduced Models for Fluid Flows with Strong Constraints.”
 38. Apr. 2008, University of California at Davis, “Reduced Models for Fluid Flows with Strong Constraints.”
 39. Feb. 2008, NCAR/IMAGE Theme-Of-the-Year Geophysical Turbulent Phenomena. Workshop on Theory and Modeling, “Rotationally Constrained Flows.”
 40. Mar. 2007, Los Alamos National Laboratory, Center for Nonlinear Science, NM, “Generalized QuasiGeostrophy for Spatially Anisotropic Rotationally Constrained Flows.”
 41. Feb. 2007, University of California at Los Alamos, Institute for Pure and Applied Mathematics, CA, “Generalized QuasiGeostrophy for Spatially Anisotropic Rotationally Constrained Flows.”
 42. Sept. 2006, SIAM Minisymposium on Reduced Models for Geophysical Flows, University of Washington, WA, “Generalized QuasiGeostrophy for Spatially Anisotropic Rotationally Constrained Flows.”
 43. June 2005, International Conference on Nonlinear Waves, Integrable Systems and Applications, University of Colorado at Colorado Springs, “Wave Dynamics in Optically Modulated Waveguide Arrays.”
 44. June 2005, SIAM Minisymposium on Patterns in Extended Systems, Snowbird UT, “Mixing in the Kuppers-Lortz Mode.”
 45. May 2005, Institute for Mathematics Applied to the Geosciences, National Center for Atmospheric Research, “Rotationally Constrained Rayleigh-Benard Convection.”
 46. Apr. 2005, University of Arizona, Applied Mathematics Program, “Rotationally Constrained Rayleigh-Benard Convection.”
 47. Mar. 2005. University of Colorado at Colorado Springs, “Rotationally Constrained Rayleigh-Benard Convection.”
 48. Oct. 2004, Department of Mathematics, Colorado State University, “An Investigation of the Reduced Set of Equations for Non-Hydrostatic Rotationally Constrained Flows.”
 49. Oct. 2004, SIAM meeting on Nonlinear Waves and Coherent Structures, University of Central

- Florida. Minisymposium, “An Investigation of the Reduced Set of Equations for Non-Hydrostatic Rotationally Constrained Flows.”
50. Oct. 2004, Department of Mathematics, University of Central Florida, “Highly Supercritical Magnetoconvection,”
 51. Apr. 2004, Nonlinear Dynamics and Astrophysics Seminar, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, “An Investigation of the Reduced Set of Equations for Non-Hydrostatic Rotationally Constrained Flows.”
 52. Oct. 2003, Boulder, Colorado, American Mathematical Society, “Two-Dimensional Solitons in Optically Modulated Waveguide Arrays.”
 53. May 2003, Rocky Mountain Workshop on Pattern Formation, Colorado State University, “Stably-Stratified and Unstably-Stratified Quasigeostrophic Flows.”
 54. Apr. 2003 High Altitude Observatory, National Center for Atmospheric Research, “Longitude-Latitude Spectral Galerkin Methods on a Sphere: Applications to Elliptic Equations,” (with Prof. Fornberg).
 55. May 2002, Department of Mathematics, University of California at Irvine, “Reduced Hydrostatic and Non-Hydrostatic Descriptions for Rotationally Constrained Flows.”
 56. Sept. 2001, Turino, Italy, Euromech Workshop 428, “Rotating Convection.”
 57. June 2001, Condom, France, Stellar and Astrophysical Fluid Dynamics, “Magnetoconvection and Reduced Partial Differential Equation Descriptions.”
 58. Mar. 2000, Colorado State University, Fort Collins, Dynamical Systems Workshop, “Highly Supercritical Magnetoconvection,”
 59. Apr. 1999, University of Colorado, Boulder, Program in Atmospheric and Oceanic Sciences Seminar, “Rapidly Rotating Convection and a Reduced PDE Description for Rotationally Constrained Flows.”
 60. Apr. 1997, Colorado State University, Fort Collins, Applied Mathematics Seminar Series, “A New Class of Equations for Rotationally Constrained Flows.”
 61. July 1996, Woods Hole Oceanographic Institute, MA, Geophysical Fluid Dynamics Summer Program Principal Lecture Series, “Weakly Nonlinear Convection I & II.”
 62. July 1995, Woods Hole Oceanographic Institute, MA, Geophysical Fluid Dynamics Summer Program Lecture, “Turbulent Rotating Rayleigh-Bénard Convection.”
 63. Apr. 1995, Florida State University, Geophysical Fluid Dynamics Institute Seminar, “Rapidly Rotating Rayleigh-Bénard Convection.”
 64. Feb. 1995, University of California at Santa-Cruz, CA, Nonlinear Dynamics Seminar Series, “Rapidly Rotating Rayleigh-Bénard Convection.”
 65. Mar. 1992, National Center for Atmospheric Research, CO, Geophysical Turbulence Program, “Strong Spatial Interactions with 1:1 Resonance: A Three-layer Convection Problem.”
 66. Aug. 1991, Woods Hole Oceanographic Institute, MA, Geophysical Fluid Dynamics Summer Program Lecture, “Strong Spatial Interactions with 1:1 Resonance: A Three-layer Convection Problem.”

CONFERENCES, MEETINGS, SEMINAR AND WORKSHOPS ACTIVITY SINCE 1998:

- July 2019 Institut d'Études Scientifiques de Cargèse, France
- June 2019 Festival de la Théorie, Aix-en-Provence, France
- Dec. 2018 American Geophysical Union, Fall Meeting, Washington DC, USA
- June 2018 Lorentz Center Workshop, Leiden, Netherlands
- March 2018 Institut d'Études Scientifiques de Cargèse, France
- Dec. 2016 American Geophysical Union, Fall Meeting, San Francisco, CA
- Nov. 2016 American Physical Society, Division of Fluid Dynamics Meeting, Portland, USA
- Aug. 2016 NCAR Workshop on Turbulence and the Climate System, Boulder, USA
- July 2016 MFO Workshop on Geophysical Turbulence, Oberwolfach, Germany
- Dec. 2015 American Geophysical Union, Fall Meeting, San Francisco, CA

- Nov. 2015 American Physical Society, Division of Fluid Dynamics Meeting, Boston, USA
- Nov. 2015 Workshop, Advancing Wall Model Development, Univ. New Hampshire, USA
- May. 2015 NSF RTG Workshop on Turbulent and Coherent Structures, Univ. Wisconsin, USA
- Dec. 2014 American Geophysical Union, Fall Meeting, San Francisco, CA
- Nov. 2014 American Physical Society, Division of Fluid Dynamics Meeting, San Francisco, USA
- Nov. 2014 Seminar, Mechanical Engineering, UC San Diego, USA
- Fall 2014 IPAM Long Program on Geophysical Turbulence, UCLA, USA
- Dec. 2013 American Geophysical Union, Fall Meeting, San Francisco, CA
- Nov. 2013 American Physical Society, Division of Fluid Dynamics Meeting, Pittsburgh, USA
- Sept. 2013 IPLEX, Connecting Theory to Experiments in GAFFD, UCLA, USA
- June 2013 SIAM Geosciences, Venice, Italy..
- Jan. 2013 Dynamics Days, Denver, CO.
- Dec. 2012 American Geophysical Union, Fall Meeting, San Francisco, CA.
- Nov. 2012 American Physical Society, Division of Fluid Dynamics Meeting, San Diego, CA.
- Oct. 2012 NSF Computational Infrastructure in the Geosciences meeting, Boulder, CO
- July 2012 American Institute for the Mathematical Sciences, Orlando, FL.
- Dec. 2011 American Geophysical Union, Fall Meeting, San Francisco, CA.
- Nov. 2011 American Physical Society, Division of Fluid Dynamics Meeting, Baltimore, MD.
- Nov. 2010 American Physical Society, Division of Fluid Dynamics Meeting, Long Beach, CA.
- Nov. 2010 American Geophysical Union, Ocean Sciences Meeting, Portland, Oregon.
- Nov. 2009 American Physical Society, Division of Fluid Dynamics Meeting, Salt Lake, Utah.
- Nov. 2008 American Physical Society, Division of Fluid Dynamics Meeting, Salt Lake, Utah.
- July/Aug 2008 NCAR/IMAGE Theme-Of-the-Year Summer School, Boulder, Colorado
- May 2008 NCAR/IMAGE Theme-Of-the-Year Workshop 2, Boulder, Colorado
- April 2008 Colloquium, University of California at Davis.
- Feb. 2008 NCAR/IMAGE Theme-Of-the-Year Workshop 1, Boulder, Colorado
- Feb. 2008 Colloquium, Department of Applied Mathematics, Boulder, Colorado.
- Nov. 2007 American Physical Society, Division of Fluid Dynamics Meeting, Salt Lake, Utah.
- Mar. 2007 SIAM, Geosciences 07 Meeting, Sante Fe, New Mexico.
- Mar. 2007 Seminar, Center for Nonlinear Sciences, Los Alamos National Laboratories, New Mexico.
- Feb. 2007 Seminar, Institute for Pure and Applied Mathematics (IPAM), University of California at Los Angeles.
- Sept. 2006 SIAM, Conference on Nonlinear Waves and Coherent Structures, Seattle, Washington.
- June 2005 International Conference on Nonlinear Waves, Integrable Systems and Applications, University of Colorado at Colorado Springs.
- June 2005 SIAM Dynamical Systems Conference, Snowbird, Utah.
- May 2005 Seminar, NCAR IMAGE (Institute for Mathematics Applied to the Geosciences)
- Apr. 2005 Seminar, University of Arizona, Tucson, Arizona.
- Mar. 2005 Seminar, University of Colorado at Colorado Springs.
- Nov. 2004 American Physical Society, Division of Fluid Dynamics Meeting, Seattle, Washington.
- Oct. 2004 SIAM Nonlinear Waves and Coherent Structures, Orlando, Florida.
- Oct. 2004 Seminar, University of Central Florida.
- Oct. 2004 Seminar, Colorado State University.
- Apr. 2004 Seminar, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, England.
- Oct. 2003 American Mathematical Society Meeting, Special Session on Nonlinear Waves, University of Colorado at Boulder.
- May 2003 Rocky Mountain Workshop on Pattern Formation, Colorado State University.
- May 2003 SIAM Dynamical Systems Conference, Snowbird, Utah.
- Apr. 2003 Seminar, NCAR HAO, High Altitude Observatory.

- May 2002 Seminar, University of California at Irvine.
- Sept. 2001 Euromech Workshop 438, Turino Italy.
- June 2001 Meeting on Stellar Astrophysical Fluid Dynamics, Condom, France.
- May 2001 SIAM Dynamical Systems Conference, Snowbird, Utah.
- Mar. 2001 Applied Mathematics Dynamical Systems Seminar.
- Feb. 2001 Colloquium, Department of Applied Mathematics, Boulder, Colorado.
- Aug. 2000 International Congress of Theoretical and Applied Mechanics, Chicago, Illinois.
- Mar. 2000 Seminar, Colorado State University.
- Sept. 1999 First International Symposium on Turbulence and Shear Flow Phenomena, Santa Barbara, California.
- Apr. 1999 Seminar, Program in Oceanic Sciences, University of Colorado at Boulder
- June 1998 Geophysical Fluid Dynamics Summer School, Woods Hole Oceanographic Institute.

COURSE INSTRUCTION AND DEVELOPMENT

DEVELOPMENT OF New CURRICULA, TOOLS AND INFRASTRUCTURE

APPM's Mathematical Visualization Toolkit.

Conceived, achieved funding for, and introduced first pilot online toolkit for solving and analyzing differential equations (In participation with James Curry, Anne Dougherty, Congming Li, and James Meiss). Original support for the project entitled "Computational and Mathematical Tools for Differential Equations on the World-Wide Web" was obtained through internal funds by Julien (PI) and Meiss (co-PI), see additional materials in 'Multiples Measures for Teaching'. This effort provided the foundation for a parallel effort funded by the Atlas Program in Calculus III (PI's Curry and Li). The current award-winning version of MVT is now an integral component of all APPM's lower division courses. This version was produced under the guidance of Professors Dougherty and Curry, Sun Microsystems and many talented students.

APPM's Computing Infrastructure

A lead participant in the redevelopment of APPM's computing infrastructure (2003-2005).

Computers and mathematical software tools are at the heart of APPM's research and teaching mission, both at the undergraduate and graduate level. Without remaining on the cutting edge of technology our curricula and mission would be greatly affected. That said, APPM's computing environment went through major changes in 2003-2005: The Newton Lab (our computing commons) was completely transformed from Solaris-based Sun machines to Linux-based machines. This is a transition being made by many science units because of the flexibility, speed and cost of Linux-based machines. However, this took dollars general not available in departmental operating budgets. The transformation now provides the core infrastructure utilized in APPM's upper divisional course. I also added a high-end computation component through a gift award from Hewlett-Packard. This enhanced our graduate and postdoctoral research effort. In house development of web-based mathematical software, particularly, the Mathematical Visualization Toolkit MVT, has played a primary role in APPM's lower division curricula.

Grants:

Development of an Undergraduate Data Visualization Toolkit in Applied Mathematics, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder, \$14,300, 2004.

Advanced Technology Platforms- Itanium2™ 2003 Academic Grant Initiative, Co-Principal Investigator (with Connors, D.), Hewlett Packard Gift No. 89932, \$153,310, 2003.

Enhancement of the Undergraduate Computational Environment in Applied Mathematics, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder, \$20,000, 2003.

Computational and Mathematical Tools for Differential Equations on the World-Wide-Web, Principal Investigator, Engineering Excellence Fund, University of Colorado at Boulder, \$19,000, 1998.

Introduction to Research (APPM 7400)

This course is designed to expose first and second year applied mathematics graduate students to the research environment, faculty, and opportunities at the university and local academic institutions.

MAJOR DEVELOPMENT OF Applied Mathematics COURSES

Differential Equations and Linear Algebra (APPM 2360)

Completely redesigned syllabi from core focus from classical outlook towards a geometric and computer assisted outlook. (In assistance with Bengt Fornberg, James Meiss, and Rodney Halburd). This was a multi-year process with trials evolving through numerous textbooks.

Course Coordinator for Differential Equations and Linear Algebra (APPM 2360, APPM 2460)

Introduced laboratory and computational projects into this large undergraduate core class (see sample lab given in additional materials).

Graduate Sequence in Numerical Analysis (APPM 5600, 5610, 6610)

Completely redesigned these courses for our graduate program (in assistance with Faculty experts on Numerical Analysis: Gregory Beylkin, Bengt Fornberg, Thomas Manteuffel, and Steve McCormick). The process ultimately extended a two-semester sequence into an in-depth three-semester sequence.

Approximation Methods: Asymptotic Methods (APPM 5480)

Redesign this courses for our graduate program, including the introduction of term projects.

COURSES

Introduction to Differential Equations and Linear Algebra (APPM 2360)

Introduction to Differential Equations (APPM 2380)

Nonlinear Dynamics and Chaos (APPM 3010)

Modeling in Applied Mathematics (APPM 4380)

Intermediate Numerical (APPM 4650)

Partial Differential and Integral Equations (APPM 5470)

Approximation/Perturbation Method Differential (APPM 5480),

Numerical Analysis I (APPM 5600)

Numerical Analysis II (APPM 5610)

Introduction to Research (APPM 7400)

ADVISING AND EDUCATIONAL SERVICE

POSTDOCTORAL RESEARCHERS

- Michael Sprague, 2003-2005
- Present Position: Senior Scientist, National Renewable Energy Laboratory
- Geoffrey Vasil, 2008-2009
- Present Position: Lecturer, Department of Mathematics and Statistics, University of Sydney, Australia
- Antonio Rubio, 2009-2012
- Present Position: Instructor, University of Arizona
- Michael Calkins, 2010-2015, NSF Postdoctoral Fellow, NSF EAR Postdoctoral Fellow
- Present Position: Assistant Professor in Physics, University of Colorado at Boulder
- Philippe Marti, 2010-2016
- Present Position: Postdoctoral Researcher, ETH, Switzerland
- Benjamin Miquel, 2014-2-19
- Nicholas Featherstone, 2014-2016
- Present Position: Senior Research Associate, University of Colorado at Boulder
- & Senior Scientist, South-West Research Institute, Boulder.
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DISSERTATION/THESIS ADVISOR

- Eric Wright, University of Colorado, (Ph.D., 2002), 1998-2002, Co-advised with C. Li, Dissertation Title: Transport in Reaction-Diffusion Systems.
Present Position: Associate Professor of Mathematics, University of Montana-Western.
- Matthew Tearle, University of Colorado, (Ph.D., 2004), 1999-2004, Co-advised with J. Werne, Dissertation Title: Stratified Shear Flows.
Present Position: MathWorks
- Paul Mullaney, University of Colorado, (Ph.D., 2004), 2001-2004, Co-advised with J.D. Meiss, Dissertation Title: Chaotic Advection and Transport.
Present Position: Senior Staff R&D Scientist, Digital Globe.
- Neil Martinsen-Burrell, University of Colorado, (Ph.D., 2004), 2001-2004, Co-advised with J. Weiss.
Dissertation Title: Merger and Alignment of Three-dimensional Quasigeostrophic Vortices.
Present Position: Software Engineer, Iowa.

- Mark Petersen, University of Colorado, (Ph.D., 2004), 2001-2004, Co-advised with G. Stewart and J. Weiss,
Dissertation Title: A Study of Geophysical and Astrophysical Turbulence using Reduced Equations.
Present Position: Senior Scientist, Los Alamos National Laboratory.
- Geoffrey Vasil, University of Colorado, (Ph.D., 2007), 2002-2007, Co-advised with N.H. Brummell.
Dissertation Topic: Rotating Flows and Magnetic Buoyancy.
Present Position: Lecturer in mathematics, University of Sydney, Australia.
- Benjamin Jamroz, University of Colorado, (Ph.D., expected 2008), 2006-2019,
Dissertation Topic: Magneto-rotational Instability and Coronal Magnetic Fields.
Present Position: Staff Scientist, TechX Corporation, Boulder..
- Michael G. Watson, University of Colorado, (Ph.D., expected 2008), 2004-2008.
Dissertation Topic: Reduced Model Investigations of Rotationally Constrained Flows in Annular Geometries.

Present Position: Staff Scientist, MIT Lincoln Laboratories.

- Ian Grooms, University of Colorado, (Ph.D., 2010), 2007-2010.
Dissertation Topic: Quantitative Exploration of Low Rossby Number Convection.
Present Position: Assistant Professor in Mathematics, University of Colorado, Boulder.
- David Nieves, University of Colorado, (Ph.D., 2016), 2011-2016.
Dissertation Topic: Investigations of reduced equations for rotating stratified flows.
Present Position: Postdoctoral Research, Woods Hole Oceanographic Inst., MA.
- Meredith Plumley, University of Colorado, (Ph.D., expected Fall 2017), 2013-2018.
Dissertation Topic: Low Rossby hydro- and magnetohydro-dynamic convection.
Winner of the AGU Donald L. Turcotte Award for PhD Dissertation.
- Amanda Mason, University of Colorado, (Ph.D., expected Fall 2021), 2016-present.
Dissertation Topic: Reduced Models for Double-Diffusive Convection.
- Abe Ellison, University of Colorado, (Ph.D., expected Fall 2021), 2016-present.
Dissertation Topic: Reduced Quasi-Geostrophic Convection on the Sphere.

UNDERGRADUATE RESEARCH ADVISOR

- Jocelyn Renner, University of Colorado, (BS, 2003), 2002-2003.
Topic: Transport in Rotating Flows.
Awards: **Astronaut Scholarship** (2002-2003),
College of Arts and Sciences Jacob Van Eck Award (2003),
College of Engineering and Applied Sciences Outstanding Graduate (2003).
- Michael Franklin, University of Colorado, (BS, 2005), 2004-2005.
Topic: Development of a Visualization Toolkit..
- Patrick McBride, University of Colorado, (BS, 2005), 2004-2005.
Topic: Development of a Visualization Toolkit.
- Ashley Moore, University of Colorado, (BS, 2006), 2003-2005.
Topic: Spectral PDE Methods.
Award: **Astronaut Scholarship** (2004-2005)
- Lauren Anderson, University of Colorado, (BS, 2007), 2003-2005.
Topic: Spectral PDE Methods.
- Benjamin Barrow, University of Colorado, (BS, expected 2008), 2005-2007.
Topic: Development of a Visualization Toolkit.
- Jonathan Steffan, University of Colorado, (BS, 2007), 2006-2007.
Topic: Reduced Model Investigations of Rotationally Constrained Flows (with M.G. Watson)
- Marcus Waldman, University of Colorado, (BS, 2008), 2006-2007.
Topic: Reduced Model Investigations of Rotationally Constrained Flows (with M.G. Watson)
- Lucero Carmona, University of Delaware, (BS, 2008), 2008
Topic: Magnetorotational Instability, SMART Summer Program (with B.Jamroz)
- Christopher Sprague, University of Colorado, (BS, 2008), 2007-2008.
Topic: Investigation of Efficient Elliptic Solvers in Spherical Geometries (with M.G. Watson)

- Paul Joos, University of Colorado, (BS, 2010), 2007-2010.
Topic: Efficient Eigensolvers for Problems with Nonseparable Dimensions
- Bobby Ho Chan, University of Colorado, (BS, 2014), 2011-2014.
Topic: Laboratory investigation of Quasigeostrophic Beta Convection (with Prof. P.D. Weidman, Scott, Kittelman)
- Kevin Hale, Harvey Mudd Summer Student, (BS, 2015), 2011-2015.
Topic: The asymptotic equivalence of fixed heat flux and fixed temperature thermal boundary conditions for rapidly rotating convection (with Prof. M. Calkins)
- Louie Long, University of Colorado, (BS, 2016), 2012-2016.

Topic: Kinematic dynamos in low Rossby and magnetic Prandtl number convection
(with Prof. M. Calkins)

- Derek Driggs, University of Colorado, (BS/MS, 2017), 2012-2017.

Topic: The asymptotic equivalence of fixed heat flux and fixed temperature thermal boundary conditions for rapidly rotating convection (with Prof. M. Calkins)

MEMBER OF DISSERTATION/THESIS COMMITTEE

- Travis Austin, University of Colorado, (APPM Ph.D. 2001)
- Mark Piper, University of Colorado, (PAOS Ph.D. 2001)
- Christina Perez, University of Colorado, (APPM Ph.D. 2002)
- Charlson Kim, University of Colorado, (PHYS Ph.D. 2003)
- Grady Wright, University of Colorado, (APPM Ph.D. 2003)
- Kristian Sandberg, University of Colorado, (APPM Ph.D. 2003)
- Eric Thaler, University of Colorado, (APPM Ph.D. 2004)
- Darin Wysham, University of Colorado, (APPM Ph.D. 2005)
- Srinath Vladnamani, University of Colorado, (APPM Ph.D. 2005)
- Dmitri Veras, University of Colorado, (APS Ph.D. 2007)
- Cory Ahrens, University of Colorado, (APPM Ph.D. 2006)
- David Fillmore, University of Colorado, (ATOC Ph.D. 2006)
- Mark Hoefer, University of Colorado, (APPM Ph.D. 2006)
- Lauren Anderson, University of Colorado, (APPM M.S. 2007)
- Jin Chao, University of Colorado, (APPM Ph.D. 2007)
- Jonathan Pietarila-Graham, University of Colorado, (APPM Ph.D. 2007)
- Thaned Rojsiriphisal, University of Colorado, (APPM Ph.D. 2007)
- Laura Waterbury, University of Colorado, (APPM M.S. 2007)
- Julia Zuev, University of Colorado, (APPM Ph.D. 2007)
- Seth Claudpierre, University of Colorado, (APPM Ph.D. 2008)
- Terry Haut, University of Colorado, (APPM Ph.D., 2008)
- Tyger Hovde, University of Colorado, (APPM M.S. 2002-)
- Vivek Kalia, University of Colorado, (ASEN Ph.D., 2009)
- Christopher Kurcz, University of Colorado, (APPM Ph.D., 2008)
- Michael Levy, University of Colorado, (APPM Ph.D., 2009)
- Jinyu Li, University of Colorado, (APPM Ph.D., 2009)
- Gregory Norgard, University of Colorado, (APPM Ph.D. 2010)
- Maribeth Oscamou, University of Colorado, (APPM M.S., 2008)
- Laura Waterbury, University of Colorado, (APPM M.S., 2008)
- David Simpson, University of Colorado, (APPM Ph.D., 2008)
- Geoffrey Vasil, University of Colorado, (APS/ATOC Ph.D., 2008)
- Nick Featherstone, University of Colorado, (APS Ph.D., 2010)
- Ian Grooms, University of Colorado, (APPM Ph.D. 2010)
- Erin Bryne, University of Colorado, (APPM Ph.D., 2011)
- Adriana Gilman, University of Colorado, (APPM Ph.D., 2011)
- Daniel Larremore, University of Colorado, (APPM Ph.D., 2011)
- Sean Nixon, University of Colorado, (APPM Ph.D., 2011)
- Scott Bachmann, University of Colorado, (ATOC Ph.D. 2012)
- David Biagioni, University of Colorado, (APPM Ph.D. 2012)
- Jason Hammond, University of Colorado, (APPM Ph.D. 2012)
- Nathan Halko, University of Colorado, (APPM Ph.D., 2012)
- Daniel Larremore, University of Colorado, (APPM Ph.D., 2012)

- Douglas Lipinski, University of Colorado, (APPM Ph.D. 2012)
- Brock Mosovsky, University of Colorado, (APPM Ph.D. 2012)
- Matthew Reynolds, University of Colorado, (APPM Ph.D. 2012)
- Sean Haney, University of Colorado, (ATOC Ph.D. 2015)
- Douglas Baldwin, University of Colorado, (APPM Ph.D., 2013)
- Adam Fox, University of Colorado, (APPM Ph.D. 2013)
- Nicholas Nelson, University of Colorado, (APS Ph.D., 2013)
- Anthony Rasca, University of Colorado, (APPM Ph.D., 2013)
- Amrik Sen, University of Colorado, (APPM Ph.D. 2013)
- Per Sebastian Skardal, University of Colorado, (APPM Ph.D., 2013)
- John Villavert, University of Colorado, (APPM Ph.D., 2013)
- Adrean Webb, University of Colorado, (APPM Ph.D. 2013)
- Dustin Keck, University of Colorado, (APPM Ph.D., 2014)
- Lei Bao, University of Colorado, (APPM Ph.D., 2015)
- Ben Greer, University of Colorado, (APS Ph.D., 2015)
- Ruth Martin, University of Colorado, (APPM Ph.D., 2015)
- Brad Martin, University of Colorado, (APPM Ph.D., 2016)
- Arin Nelson, University of Colorado, (ATOC Ph.D., 2016)
- David Nieves, University of Colorado, (APPM Ph.D. 2016)
- Anthony Wong, University of Colorado, (APPM Ph.D., 2016)
- Ignas Satkauskas, University of Colorado, (APPM Ph.D., 2010-2016)
- Rebecca Mitchell, University of Colorado, (APPM Ph.D., 2013-2017)
- Meredith Plumley, University of Colorado, (APPM Ph.D., 2013-2018)
- Nathan Guillery, University of Colorado, (APPM Ph.D., 2014-2018)
- Patrick Sprenger, University of Colorado, (APPM Ph.D., 2014-2020)
- Evan Anders, University of Colorado, (APS Ph.D., 2014-2020)
- Ryan Overdahl, University of Colorado, (APS Ph.D., 2014-present)
- L. Minah Yang, University of Colorado, (APPM Ph.D., 2017-present)
- Ming Yang, University of Colorado, (PHYS Ph.D., 2017-present)
- Zofia Stanley, University of Colorado, (APPM Ph.D., 2017-present)
- Rachel Robey, University of Colorado, (APPM Ph.D., 2019-present)

OTHER EDUCATION RELATED ACTIVITIES

- High Schools Honors Institute, Applied Mathematics Faculty Coordinator, July 2000, 2002.
- APPM Coordinator for Open Day in School of Engineering, (2001).
- Development Team for World Wide Web based Mathematical Visualization Toolkit (1.0) for Integration into Applied Mathematics undergraduate curriculum, 1998-2000
- Coordinator of Itanium Computing Environment, 2003-2008.
- Faculty Coordinator for APPM VIGRE (Vertical Integration of Graduate Research and Educations) Dynamics Group (with Prof. J..D Meiss and Prof. J. H. Curry).
- Faculty Coordinator for APPM VIGRE Fast Algorithms Group (with Prof. G. Belykin and Prof. B. Fornberg).