

Pedram Hassanzadeh

Rice University
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Employment

Rice University

Assistant Professor, Department of Mechanical Engineering (2016-present)
Joint appointment with the Department of Earth Science

Harvard University

Associate, Department of Earth and Planetary Sciences (2016)
Postdoctoral Fellow, Department of Earth and Planetary Sciences (2015–2016)
Ziff Environmental Fellow, Center for the Environment (2013–2015)

University of California, Berkeley

Graduate Student Researcher, Department of Mechanical Engineering (2008–2013)

Woods Hole Oceanographic Institution

Fellow, Geophysical Fluid Dynamics Program (summer 2012)

University of Waterloo

Research Associate, Department of Mechanical Engineering (2007–2008)
Graduate Research Assistant, Department of Mechanical Engineering (2005–2007)

Education

University of California, Berkeley

PhD, Mechanical Engineering (2013)
Advisor: Philip Marcus
Thesis: *Baroclinic vortices in rotating stratified shearing flows: cyclones, anticyclones, and zombie vortices*
MA, Mathematics (2012)
Advisor: Jon Wilkening
Thesis: *Optimal transport from wall to wall*

University of Waterloo

MASc, Mechanical Engineering (2007)
Advisor: George Raithby
Thesis: *An efficient computational method for thermal radiation in participating media*

University of Tehran

BSc, Mechanical Engineering (2005)
Advisor: Vahid Esfahanian
Thesis: *Numerical simulation of electrokinetic flows in microchannels*

Funded Grant Proposals

Atmospheric blocking: dynamics and responses to climate change, *NSF Climate and Large-Scale Dynamics Program*, AGS-1552385, with Zhiming Kuang, \$540,436 (2016–2019)

Honors & Awards

First-authored paper in GRL was selected for AGU Research Spotlight & Editor's Highlights (2014)

Ziff Environmental Fellowship, Harvard University Center for the Environment (2013–2015)

Postdoctoral Award for Professional Development, Office of Postdoctoral Affairs, Harvard University (2014)

Geophysical Fluid Dynamics Fellowship, Woods Hole Oceanographic Institution (2012)

NSERC Postgraduate Scholarship, Natural Sciences & Engineering Research Council of Canada (2009–2011)

Outstanding Preliminary Examination Award, ME Department, UC Berkeley (2009)

Jonathan Laitone Memorial Scholarship, ME Department, UC Berkeley (2009)

Eiffel Scholarship, French Ministry of Foreign Affairs and International Development (2005, declined)

International Graduate Student Award, University of Waterloo (2005–2007)

Journal Papers

Submitted

Ma D., P. Hassanzadeh & Z. Kuang, Quantifying the eddy-jet feedback strength of the annular mode in an idealized GCM and reanalysis data, *J. Atmospheric Sciences*

Mahdinia M., P. Hassanzadeh, P. S. Marcus & C.-H. Jiang, Stability of 3D Gaussian vortices in rotating stratified Boussinesq flows: Linear analysis, *J. Fluid Mechanics*

Published

12. Hassanzadeh P. & Z. Kuang, The linear response function of an idealized atmosphere. Part II: Implications for the practical use of the Fluctuation-Dissipation Theorem and the role of operator's nonnormality, *J. Atmospheric Sciences*, (79) 2016

11. Hassanzadeh P. & Z. Kuang, The linear response function of an idealized atmosphere. Part I: Construction using Green's functions and applications, *J. Atmospheric Sciences*, (79) 2016

10. Hassanzadeh P. & Z. Kuang, Blocking variability: Arctic Amplification versus Arctic Oscillation, *Geophysical Research Letters*, (42) 2015

9. Marcus P. S., S. Pei, C.-H. Jiang, J. Barranco, P. Hassanzadeh & D. Lecoanet, Zombie vortex instability. I. A purely hydrodynamic instability to resurrect the dead zones of protoplanetary disks, *Astrophysical J.*, (808) 2015

8. Hassanzadeh P., Z. Kuang & B. F. Farrell, Responses of midlatitude blocks and wave amplitude to changes in the meridional temperature gradient in an idealized dry GCM, *Geophysical Research Letters*, (41) 2014 (selected for AGU Research Spotlight & GRL Editor's Highlights)

7. Hassanzadeh P., G. P. Chini & C. R. Doering, Wall to wall optimal transport, *J. Fluid Mechanics*, (751) 2014

6. Marcus P. S., S. Pei, C.-H. Jiang & P. Hassanzadeh, Three-dimensional vortices generated by self-replication in stably stratified rotating shear flows, *Physical Review Letters*, (111) 2013

5. Hassanzadeh P., P. S. Marcus & P. Le Gal, The universal aspect ratio of vortices in rotating stratified flows: theory and simulation, *J. Fluid Mechanics*, (706) 2012

4. Hassanzadeh P. & G. D. Raithby, Efficient iterative solution of the P1 equation, *J. Heat Transfer*, (131) 2008

3. Hassanzadeh P., G. D. Raithby & E. H. Chui, Efficient calculation of radiation heat transfer in anisotropically scattering media using the QL method, *J. Computational Thermal Sciences*, (1) 2009
2. Hassanzadeh P. & G.D. Raithby, Application of the finite volume method to the second-order radiative transfer equation: accuracy and solution cost, *J. Numerical Heat Transfer-B*, (53) 2008
1. Hassanzadeh P., G. D. Raithby & E. H. Chui, The efficient calculation of radiation heat transfer in participating media, *J. Thermophysics and Heat Transfer*, (22) 2008

Invited Talks

Jet stream variabilities and extreme weather events: A linear response function perspective, *SIAM Conference on Mathematics of Planet Earth*, Mini-symposium on Recent Theoretical and Computational Advances in Prediction of Rare and Extreme Events, Philadelphia 2016

Jet stream variabilities and extreme weather events, *Rice University*, Department of Earth Science 2016

Fluid dynamics of extreme weather events, *Rice University*, Department of Mechanical Engineering 2016

Blocking variability: Arctic Amplification versus Arctic Oscillation, *Columbia University*, SEAS colloquium in Climate Science 2015

Midlatitude extreme weather events and climate change, *UCLA*, AOS Department seminar 2015

Extreme weather events in a changing climate, *Harvard University*, Center for the Environment 2015

Response of midlatitude extreme weather events to climate change, *UC Berkeley*, EPS colloquium 2015

Changes of midlatitude blocks and wave amplitude with reduced meridional temperature gradient: Arctic Amplification versus Arctic Oscillation, *MIT*, MASS seminar 2015

3D vortices in rotating stratified shearing flows: from oceans to Jupiter and beyond, *Caltech & UCLA* 2012

Presentations

Blocking variability: relationship with Arctic Oscillation, Arctic Amplification, and synoptic eddies, Workshop on Atmospheric Blocking, University of Reading 2016

Responses of midlatitude blocking activity and wave amplitude to reduced meridional temperature gradient: Arctic Amplification versus Arctic Oscillation, AMS-AOFD Meeting 2015

The linear response function of an idealized atmosphere, AMS-AOFD Meeting 2015 (poster)

How do midlatitude blocks and wave amplitude respond to changes in the meridional temperature gradient? a study with an idealized dry GCM, AGU Annual Meeting 2014 (poster) & AMS Annual Meeting 2015

Atmospheric blocks and wavy jet streams: how well do we understand the fluid dynamics of midlatitude weather extremes? Workshop on Geophysical and Astrophysical Turbulence, IPAM-UCLA 2014 (poster)

On the unexpected longevity of the Great Red Spot, oceanic eddies, and other baroclinic vortices, APS-DFD Annual Meeting 2013

The unexpected longevity of baroclinic vortices, workshop on Connecting Theory to Experiments in Geophysical and Astrophysical Fluid Dynamics, UCLA 2013

A universal diagnostic equation for the aspect ratio of oceanic eddies and its applications: theory, simulation, experiment and observation, AGU Annual Meeting 2012

3D baroclinic vortices in rotating stratified shear: from an orange Great Red Spot to planet formation, AGU Annual Meeting (poster) & APS-DFD Annual Meeting 2012

Optimal transport: wall to wall, UC Berkeley Fluids Seminar and WHOI GFD Program 2012

3D structure and internal circulation of pancake cortices in rotating stratified flows, NCAR IMAGE Theme of the Year on Turbulence workshop 2012 and APS-DFD Annual Meeting 2011

How do 3D vortices spin down, or do they?, APS-DFD Annual Meeting 2010

The efficient calculation of radiation heat transfer in anisotropically scattering media using the QL method, Advances in Computational Heat Transfer Conference, Marrakesh 2008 (poster)

Professional Services

Reviewer

Geophysical Research Letters, Journal of Fluid Mechanics, Journal of Climate, Journal of Geophysical & Astrophysical Fluid Dynamics, Proceedings of the Royal Society A, Atmospheric Chemistry and Physics

Organizer

Reading group *Extreme Weather Events in a Changing Climate*, Harvard University (2015–2016)

Chair

Session *Transport & Mixing*, AMS-AOFD Meeting 2015

Session *Geophysical: Stratified Flows*, APS-DFD Annual Meeting 2013

Workshop & Meeting Attendance

Workshop on Atmospheric Blocking, University of Reading, 2016

Geophysical and Astrophysical Turbulence, Mathematic of Turbulence program, IPAM-UCLA, 2014

Wave-Flow Interaction in Geophysics, Climate, Astrophysics, and Plasmas, KITP-UCSB, 2014

Water in the Climate System, MIT Lorenz Center, 2014

Connecting Theory to Experiments in Geophysical and Astrophysical Fluid Dynamics, iPLEX-UCLA, 2013

Connections between Rotating, Stratified Turbulence and Climate: Theory, Observations, Experiments, and Models, NCAR IMAGE Theme of the Year on Turbulence, 2012