George Hagstrom
Department of Ecology and Evolutionary Biology
Guyot Hall
Princeton University
Princeton, NJ, 08544
www.georgehagstrom.com
georgehagstrom@gmail.com
(505)615-9816

Interests

Theoretical ecology, dynamics of marine ecosystems, global biogeochemical cycles, collective behavior, applied mathematics.

Education

- Ph.D. in Physics, University of Texas at Austin, August 2011.
- Thesis Adivsor: Philip Morrison.
- B.S. in Physics with honors, California Institute of Technology, June 2006.

Employment

- September 2014-Present Postdoctoral Research Associate, Department of Ecology and Evolutionary Biology, Princeton University.
- Spring 2013-August 2014: Courant Instructor, Courant Institute of Mathematical Sciences, New York University.
- Fall 2011-Winter 2012: Assistant Research Scientist, Courant Institute of Mathematical Sciences, Magneto-Fluids Division, New York University.
- 2008-2011: Graduate Research Assistant, Institute for Fusion Studies, Department of Physics, University of Texas at Austin. Supervisor: Philip Morrison.
- Summer 2008: GFD Fellow, Woods Hole Oceanographic Institution. Charlie Doering.

- 2006-2008: Teaching Assistant, Department of Physics, University of Texas at Austin.
- Summer 2006: Technical Intern, Computer Science Research Institute, Sandia National Laboratories. Supervisor: Louis Romero.
- 2003-2004: Summer Undergraduate Research Fellow, Digital Evolution Laboratory, Department of Computer Science, Michigan State University. Supervisor: Charles Ofria.

Manuscripts in Preparation

1. The influence of non-Redfield Stoichiometry on the Carbon Cycle. (with A. Moreno, A. Martiny, and S. Levin)

Submitted Manuscripts

1. Resource ratios determine nutrient limitation of primary productivity in the ocean. (with S. Levin and A. Martiny). In review at *PNAS*. Preprint: `http://biorxiv.org/content/biorxiv/early/2016/07/18/064543.full.pdf`
2. Managing Marine Ecosystems as Complex Adaptive Systems: Emergent Patterns, Critical Transitions, and Public Goods. (with S. Levin). In review at *Ecosystems*. Preprint: `http://biorxiv.org/content/biorxiv/early/2016/06/07/056838.full.pdf`

Refereed Publications

1. The Evolution of Distributed Sensing and Collective Computation in Animal Populations. (with A. Hein, S. B. Rosenthal, A. Berdahl, C. Torney, and I. D. Couzin). *eLife* 2015;4:e10955. `https://elifesciences.org/content/4/e10955`
2. Travelling Waves in Hall-MHD and the Ion-Acoustic Shock Structure (with E. Hameiri). *Phys. of Plasmas*. Volume 21, 022109, 2014. `http://arxiv.org/abs/1311.4923`
3. On the Continuum Hamiltonian Hopf Bifurcation II (with P.J. Morrison), O. Kirilov editor. In *Nonlinear Physical Systems Spectral Analysis, Stability and Bifurcations*, Wiley, 2013. `http://arxiv.org/abs/1308.6161`
4. On the Continuum Hamiltonian Hopf Bifurcation I (with P.J. Morrison), O Kirilov editor. In *Nonlinear Physical Systems Spectral Analysis, Stability and Bifurcations*, Wiley, 2013. `http://arxiv.org/abs/1308.3807`

5. Bounds on Surface Stress-Driven Shear Flow (with C.R. Doering). To appear in *JNLS*, http://dx.doi.org/10.1007/s00332-013-9183-4

6. Grid stabilization of high-order one-sided differencing II: Second-order wave equations, Journal of Computational Physics, (with T. Hagstrom). *J. Comp. Phys.* Volume 231, Issue 23, January 2012. http://dx.doi.org/10.1016/j.jcp.2012.07.033

7. Caldeira-Leggett model, Landau damping, and the Vlasov-Poisson system, (with P.J. Morrison). *Physica D.* Volume 240, Issue 20. October 2011. 1652-1660. http://dx.doi.org/10.1016/j.physd.2011.02.007.

8. On Krein-like theorems for noncanonical Hamiltonian systems with continuous spectra: application to Vlasov-Poisson (with P.J. Morrison). *Trans. Theory and Stat. Phys.* Volume 39, Numbers 5-7. March 2011. 466-501. http://dx.doi.org/10.1080/00411450.2011.566484

9. Bounds on the Nusselt Number in Benard-Marangoni Convection (with C.R. Doering). *Phys. Rev. E.* Volume 81, Issue 4. April 2010. http://link.aps.org/doi/10.1103/PhysRevE.81.047301

10. Grid stabilization of high-order one-sided differencing I: First-order hyperbolic systems (with T. Hagstrom). *J. Comp. Phys.* Volume 223, Issue 1. April 2007. Pages 316-340. http://dx.doi.org/10.1016/j.jcp.2006.09.017

11. Using AVIDA to test the effects of natural selection on phylogenetic tree reconstruction methods. *Artificial Life.* Volume 10, Issue 2. October 2004. Pages 157-166. http://www.mitpressjournals.org/doi/abs/10.1162/106454604773563586

Technical Reports

1. Bounds on surface stress driven flows. *P*erspectives and Challenges in GFD. 2009.

Honors and Awards

- 2013: Fellowship, CNRS/Vlasovia
- 2011: Student Poster Prize, Sherwood Fusion Theory Conference.
- 2009: University of Texas Professional Development Grant.
- 2008: Fellow, Geophysical Fluid Dynamics Summer Program. Woods Hole Oceanographic Institute.
- 2007: Honorable Mention, NSF Graduate Research Fellowship Program.

Invited Talks

1. Ocean Life Seminar, DTU Copenhagen, September 2016.
2. Theoretical Ecology Lab Tea, Princeton University, May 2016.
3. BPE Seminar, Lamont-Doherty Earth Observatory, Columbia University, May 2016.
4. Ecological Stoichiometry, Geophysical Fluid Dynamics Laboratory, March 2016.
5. Biogeochemical Cycles Seminar, University of California at Irvine, January 2016.
6. Theoretical Ecology Lab Tea, Princeton University, December 2015.
7. Mathematical Biology Seminar, University of Pennsylvania, October 2015.
8. Fish Baste Seminar, Rutgers University, September 2015.
9. Theoretical Ecology Lab Tea, May 2015
10. Colloquium, Army Research Lab, May 2014
11. Waves Seminar, New Jersey Institute of Technology, May 2014.
12. Theoretical Ecology Seminar, Princeton University, April 2014.
13. Waves Seminar, New Jersey Institute of Technology, October 2013.
14. GFD Seminar, Woods Hole Oceanographic Institution, July 2013.
15. Magneto-Fluids Seminar, Courant Institute for Mathematical Sciences, April 2013.
16. Analysis Seminar. Courant Institute for Mathematical Sciences. October 2011.
17. GFD Seminar. Woods Hole Oceanographic Institution. July 2011.
18. Working Dynamical Systems Seminar. University of Texas at Austin, April 2011.
19. Magneto-Fluids Seminar. Courant Institute for Mathematical Sciences. March 2011.
20. Graduate Student and Postdoc Seminar. Center for Nonlinear Studies, Sandia National Laboratories. February 2011.
21. Working Dynamical Systems Seminar, University of Texas at Austin. April 2010.

Conference Proceedings

1. Ecological Problems in the Human Microbiome. Casarti Seminar. 2016. Oral Session.

2. The Influence of Resource Ratios on Primary Productivity and Nutrient Limitation in the Ocean. Gordon Research Conference. 2016. Poster Session.

3. The Influence of Resource Ratios on Primary Productivity and Nutrient Limitation in the Ocean. Gordon Research Seminar. 2016. Poster Session.

4. The Influence of Resource Ratios on Primary Productivity and Nutrient Limitation in the Ocean. Gordon Research Seminar. 2016. Oral Session.

5. The Influence of Resource Ratios on Primary Productivity and Nutrient Limitation in the Ocean. Quantiative Laws Summer School II. 2016, Oral Session.

6. Evolution of Distributed Sensing and Collective Computation in Animal Groups. Challenges in Statistical Physics and Fluids Dynamics, a Conference in Honor of Charlie Doering, 2016, Oral Session.

7. Non-Redfield Stoichiometry and Biogeochemical Cycles, NSF Dimensions of Biodiversity 2016.

8. The Influence of Resource Ratio Theory on Primary Productivity in the Ocean, AGU 2016. Beyond Redfield Oral Session.

9. Deviations from the Redfield Ratio and the Carbon Cycle, Traits 2015 Meeting.

10. Evolution of Distributed Sensing and Collective Computation in Animal Populations, 2015 ESA Meeting.

11. Stability of Waterbag Equilibria of the Single Wave Model. 2014 Sherwood Fusion Theory Conference.

12. Stability of Inhomogeneous Equilibria of the Single Wave Model. Vlasovia 2013. Oral Session.

13. Stability of Inhomogeneous Equilibria of Hamiltonian Continuous Media Field Theories. 2013 APS-DPP meeting Session PP8.0108

14. Shock Structures in Hall-MHD (with E. Hameiri). 2013 Sherwood Fusion Theory Conference.

15. On the Continuum Hamiltonian Hopf Bifurcation II (with P.J. Morrison). BIRS Conference on Spectral Analysis, Stability and Bifurcation in Modern Nonlinear Physical Systems, 2012.

16. Shock Waves in Hall-MHD (with E. Hameiri). 2012 Sherwood Fusion Theory Conference, Session S1.00029.

17. Shock Waves in Hall-MHD (with E. Hameiri). 2012 IPAM Plasma Workshop III: Mathematical and Computer Science Approaches to High Energy Density Physics

18. Shock Waves in Hall-MHD (with E. Hameiri). 2012 APS-DPP meeting Session GP8.00053

19. Landau Damping as a General Description of Dissipation (with P.J. Morrison). 2011 APS-DPP Meeting. Session GP9.00021.

20. Caldeira-Leggett Model, Vlasov-Poisson Equation, and Landau Damping (with P.J. Morrison). 2011 Sherwood Fusion Theory Conference. 2P32.

21. A transformation identifying the Caldeira-Leggett model with the linear Vlasov-Poisson system, (with P.J. Morrison). 2010 APS-DPP Meeting. Session PP9.00103.

22. Krein-like theorems for non-canonical Hamiltonian systems with continuous spectra: application to Vlasov-Poisson, (with P.J. Morrison). 2010 International Sherwood Fusion Theory Conference. 1P33

23. Bounds on the Nusselt Number for Marangoni Convection, (with C. Doering). 2009 APS-DFD Meeting. Session LR.008

24. A Krein-like Theorem for the Linearized Vlasov-Poisson Equation, (with P.J. Morrison). 2009 APS- DPP Meeting. Session GP8.00153

25. Bifurcations of the Continuous Spectrum in the Vlasov Poisson Equation, (with P.J. Morrison). APS-DPP Annual Meeting 2008. Session CP6.00055

Workshops

1. Gordon Research Conference on Ecology Across Scales, University of New England, 2016.

2. Gordon Research Seminar on Ecology Across Scales, University of New England, 2016.

3. Quantitative Laws Summer School II, Lame Como, Italy, 2016.

4. OCB Traits 2015 Meeting, Waterville Valley New Hampshire, 2015.

5. Workshop on Mathematical Biology and Nonlinear Analysis. Miami University, 2014.

6. Princeton-Humboldt Workshop on Reality Mining of Animal-Human Systems. Humboldt University, 2014.

7. Summer Program in Geophysical Fluid Dynamics. Woods Hole Oceanographic Institution, Summer 2013, 2012, 2011, 2010, 2008.

8. BIRS Conference on Spectral Analysis, Stability and Bifurcation in Modern Nonlinear Physical Systems. BIRS, November 2012.

9. IPAM Plasma Workshop III: Mathematical and Computer Science Approaches to High Energy Density Physics. UCLA, April 2012.

10. Novel Applications of Kinetic Theory and Computation. ICERM, October 2011.

11. Vlasov Models in Kinetic Theory. ICERM, September 2011.

12. ITER school. University of Texas at Austin. May 2010.

Teaching Experience

- Courant Institute of Mathematical Sciences: Intructor for Mathematics for Economics I. Spring 2014.
- Courant Institute of Mathematical Sciences: Instructor for Calculus I. Fall 2013.
- Courant Institute of Mathematical Sciences: Instructor for Dynamical Systems and Chaos. Spring 2013.
- University of Texas at Austin: Teaching Assistant for Physics 336K, Classical Dynamics I. Fall 2006, Spring 2007, Fall 2007.

Programming Skills

- Knowledge of C, C++, MPI, Python, Matlab

Service

- 2016: Member of PNAS Journal Club
- 2015-2016: Reviewed grant proposals for NSF
- 2014: Joined American Physical Society Division of Plasma Physics Education and Outreach Committee
- 2013: Discussed Research in Plasma Physics with Stanford EPGY summer students.
- 2010: Served on panel to improve the environment for women and underrepresented minorities in the physics department at the University of Texas at Austin.

- 2009-2010: Volunteer mathematics tutor for topology and real analysis.