

Graduate Teaching Assistant

(Department of Theoretical and Applied Mechanics)

- ❑ Fall 2000 : Laboratory sessions for “Introduction to Fluid Mechanics” (UG; TAM 335)
- ❑ Spring 2001 : Discussion sessions for “Introduction to Solid Mechanics” (UG; TAM 251)
- ❑ Spring 2002 : Grader for “Fluid Mechanics II: Viscous Flow” (G; TAM 532)
- ❑ Fall 2003 : Discussion sessions for “Introduction to Solid Mechanics” (UG; TAM 251)
- ❑ Fall 2005: ‘Super TA’ and discussion sessions for “Introduction to Statics” (UG; TAM 210/211)
- ❑ Spring 2006: ‘Super TA’ for “Introduction to Solid Mechanics” (UG; TAM 251)

HONORS AND
AWARDS

TAM merit award, 2006, TAM, UIUC.

Robert E. Miller award for teaching of mechanics, 2006, TAM, UIUC.

Campus award for excellence in undergraduate teaching, 2005, UIUC.

Mavis memorial fund scholarship, 2003, 2004, College of Engineering, UIUC.

James O. Smith award for most effective teaching assistant 2002, 2004, TAM, UIUC.

Computational Science and Engineering fellowship 2001-02, 2002-03, UIUC.

Graduate teaching certificate, 2001, UIUC.

List of teachers ranked as excellent by their students, Fall 2000, Spring 2001, Summer 2001, Spring 2002, Fall 2003, Fall 2004, Fall 2005, Spring 2006 UIUC.

Graduate enhancement fellowship 2000-01, TAM, UIUC.

Best Research Paper award: Mechanical Engineering, 1997, IIT Kanpur, India; Computer Science, 1999, BITS Pilani, India; Pure Sciences, 2000, NIT Surat, India.

PUBLICATIONS

T. Tran, P. Chakraborty, N. Guttenberg, A. Prescott, H. Kellay, W. Goldberg, N. Goldenfeld, and G. Gioia. 2010. Macroscopic effects of the spectral structure in turbulent flows. **Nature Physics**, vol. 6, no. 6, pp. 438-441. (Cover Image.)

F. Huang*, P. Chakraborty*, C. C. Lundstrom, C. Holmden, J. J. G. Glessner, S. Kieffer, and C. E. Lesher. 2010. Isotope fractionation in silicate melts by thermal diffusion. **Nature**, vol. 464, no. 7287, pp. 396-400. (* These authors contributed equally to this work.)

G. Gioia, N. Guttenberg, N. Goldenfeld, and P. Chakraborty. 2010. The turbulent mean-velocity profile: it is all in the spectrum. **Physical Review Letters** (under review).

T. Tran, P. Chakraborty, G. Gioia, S. Steers, and W. Goldberg. 2009. Marangoni shocks in unobstructed soap-film flows. **Physical Review Letters**, vol. 103, article 104501.

P. Chakraborty, G. Gioia, and S. Kieffer. 2009. Volcanic Mesocyclones. **Nature**, vol. 458, no. 7237, pp. 497-500. (Featured in New view on erupting volcanoes, *Nature Hot Topics*, 26 March 2009; Volcano or tornado?, *Nature Podcast*, 26 March 2009; Inside the volcanoes plume a thunderstorm rages, *National Public Radio*, 25 March 2009; etc.)

G. Gioia, P. Chakraborty, S. Marshak, and S. Kieffer. 2007. Unified model of tectonics and heat transport in a frigid Enceladus. **Proceedings of the National Academy of Sciences**, vol. 105, no. 34, pp. 13578-13581. (Cover Image; Featured in *Physics Today*, October 2007; *This Week in PNAS*, Saturn Moon’s geysers don’t need liquid water?, *National Geographic News*, 17 August 2007; etc.)

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2007. Kinematics of Local Vortex Identification Criteria. **Journal of Visualization**, vol. 10, no. 2, pp. 137-140. (Invited review paper.)

G. Gioia, P. Chakraborty, and S. Kieffer. 2006. Lava channel formation via the viscoplastic indentation of hot substrates. **Geophysical Research Letters**, vol. 33, L19305.

P. Chakraborty, G. Gioia, and S. Kieffer. 2006. Volcán Reventador's unusual umbrella. **Geophysical Research Letters**, vol. 33, L05313. (Featured in Research Highlight: Blowing its top, *Nature*, 440, 386, 2006; Editor's Choice: Collapsing umbrella, *Science*, 311, 1675, 2006; Odd eruption may mean new volcano danger, *National Geographic News*, 15 March 2006; etc.)

G. Gioia and P. Chakraborty. 2006. Turbulent friction in rough pipes and the energy spectrum of the phenomenological theory. **Physical Review Letters**, vol. 96, article 044502. (Featured in New UI research looks into classic unsolved problem, *Chicago Tribune*, 2 April 2006; Turbulence - the last mystery of classical physics, *Softpedia*, 12 Feb 2006; etc.)

G. Gioia, P. Chakraborty, and F. Bombardelli. 2006. Rough-pipe flows and the existence of fully developed turbulence. **Physics of Fluids**, vol. 18, article 038107.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2006. Comment on "Axial stretching and vortex definition". **Physics of Fluids**, vol. 18, article 029101.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2005. On the relationships between local vortex identification schemes. **Journal of Fluid Mechanics**, vol. 535, pp. 189-214.

CONFERENCE PRESENTATIONS P. Chakraborty, G. Gioia, and S. Kieffer. 2010. Rotating Volcanic Plumes: Lobate Umbrellas, Tornadoes, and Lightning Sheaths. Dynamics Days 2010, Evanston, Illinois, January 2010.

C. Zuniga Zamalloa, P. Chakraborty, N. Goldenfeld, and G. Gioia. 2010. Relating turbulent friction and energy spectrum in rough-pipe flows. Dynamics Days 2010, Evanston, Illinois, January 2010.

G. Gioia, N. Guttenberg, N. Goldenfeld, and P. Chakraborty. 2010. The turbulent mean-velocity profile: it is all in the spectrum. Dynamics Days 2010, Evanston, Illinois, January 2010.

C. Zuniga Zamalloa, P. Chakraborty, N. Goldenfeld, and G. Gioia. 2009. Relating turbulent friction and energy spectrum in rough-pipe flows. Annual Meeting of American Physical Society – Division of Fluid Dynamics (APS-DFD), Minneapolis, Minnesota, November 2009.

J. Kolinski, P. Chakraborty, G. Gioia, and S. Kieffer. 2009 Morphological transitions in rapidly expanding compressible foams. Fluid-DTU (Center for Fluid Dynamics at the Technical University of Denmark) Summer School—Complex Motion in Fluids, Krogerup, Humlebæk, Denmark, August 2009.

- T. Tran, P. Chakraborty, G. Gioia, N. Guttenberg, N. Goldenfeld, A. Prescott, W. I. Gold-
burg, and H. Kellay. 2009. The friction factor of 2D turbulent flow in soap films. *Nonlinear
Science Gordon Research Conference*, South Hadley, Massachusetts, June-July 2009.
- N. Guttenberg, N. Goldenfeld, G. Gioia, and P. Chakraborty. 2009. Scaling and criticality
in two-dimensional turbulence. *Nonlinear Science Gordon Research Conference*, South
Hadley, Massachusetts, June-July 2009.
- P. Chakraborty, G. Gioia, and S. Kieffer. 2008. Volcanic Mesocyclones. *American Geophys-
ical Union (AGU) Fall Meeting*, San Francisco, California, December 2008.
- J. Kolinski, P. Chakraborty, G. Gioia, and S. Kieffer. 2008 Morphological transition in
rapidly expanding magmas. *AGU Fall Meeting*, San Francisco, California, December 2008.
- P. Chakraborty, S. Kieffer, and G. Gioia. 2008. Rayleigh-Taylor instability in rotating vol-
canic umbrellas. *Annual Meeting APS-DFD*, San Antonio, Texas, November 2008.
- T. Tran, P. Chakraborty, G. Gioia, S. Steers, and W. Goldburg. 2008 Hydraulic jump in
falling soap films. *Annual Meeting APS-DFD*, San Antonio, Texas, November 2008.
- J. Larkin, W. Goldburg, T. Tran, P. Chakraborty, and G. Gioia. 2008 Turbulent dynamics
of a hydraulic jump in two dimensions: soap film flow *Annual Meeting APS-DFD*, San
Antonio, Texas, November 2008.
- P. Chakraborty, S. Balachandar, and R. J. Adrian. 2007. Identification of vortices in complex
flows. *AGU Fall Meeting*, San Francisco, California, December 2007. (Invited Speaker)
- P. Chakraborty, S. Kieffer, and G. Gioia. 2007. Mount Pinatubo's starfish umbrella plume.
AGU Fall Meeting, San Francisco, California, December 2007.
- T. Tran, P. Chakraborty, G. Gioia, and N. Goldenfeld. 2007 Abrupt thickening of soap films.
Annual Meeting APS-DFD, Salt Lake City, Utah, November 2007.
- A. Poole, P. Chakraborty, G. Gioia, and F. A. Bombardelli. 2006. Time-dependent turbulent
scouring. *Annual Meeting APS-DFD*, Tampa Bay, Florida, November 2006.
- J. M. Kolinski, J. M. Austin, G. Gioia, P. Chakraborty, and S. W. Kieffer. 2006. Annular
waves on the surface of impact-formed tektites. *Annual Meeting APS-DFD*, Tampa Bay,
Florida, November 2006.
- P. Chakraborty, G. Gioia, and S. Kieffer. 2006. Volcán Reventador's unusual umbrella.
Cities On Volcanoes 4 Conference, Quito, Ecuador, January 2006.
- P. Chakraborty, G. Gioia, and S. Kieffer. 2005. Volcán Reventador's unusual umbrella.
AGU Fall Meeting, San Francisco, California, December 2005.
- P. Chakraborty, S. Balachandar, and R. J. Adrian. 2005. Practical considerations in the
identification of vortices amidst vortex interactions. *Annual Meeting APS-DFD*, Chicago,

Illinois, November 2005.

G. Gioia, and P. Chakraborty. 2005. Unveiling the ties between Nikuradse and Kolmogorov: How to derive the diagram from the spectrum. Annual Meeting APS–DFD, Chicago, Illinois, November 2005.

S. Gary, R. Keane, M. Dameron, G. Gioia, and P. Chakraborty. 2005. Residence time of a buoyant ball in a hydraulic jump. Annual Meeting APS–DFD, Chicago, Illinois, November 2005.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2004. Extracting hierarchy of vortices in multiscale flows. Annual Meeting APS–DFD, Seattle, Washington, November 2004.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2004. Local vortex identification criteria: formulation, inter-relationships and issues. International Union of Theoretical and Applied Mechanics (IUTAM) Symposium on Elementary Vortices and Coherent Structures: Significance in Turbulence Dynamics, Kyoto, Japan, October 2004. (paper in proceedings)

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2004. On local vortex identification. 21st International Congress of Theoretical and Applied Mechanics (ICTAM), Warsaw, Poland, August 2004.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2003. Toward a unified local vortex identification criterion. Annual Meeting APS–DFD, East Rutherford, New Jersey, November 2003.

P. Chakraborty, S. Balachandar, and R. J. Adrian. 2003. Vortex Identification in Turbulent Flows: Isotropic, Sphere Wake, Channel. American Society of Mechanical Engineers (ASME) 2003 Fluids Engineering Division Summer Meeting, Honolulu, Hawaii, July 2003. (paper in proceedings)

INVITED TALKS

Institute for Science and Technology Austria, Klosterneuburg, Austria, 12 April 2010.

Mathematical Institute, University of Oxford, Oxford, England, 26 March 2010.

Department of Earth Sciences, University of Oxford, Oxford, England, 25 March 2010.

Department of Mechanical Engineering, McGill University, Montreal, Quebec, Canada, 17 February 2010.

Department of Civil Engineering, University of Minnesota, Minneapolis, Minnesota, 10 February 2010.

Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton, Alberta, Canada, 1 February 2010.

Department of Mechanical and Manufacturing Engineering, University of Calgary, Calgary, Alberta, Canada, 29 January 2010.

Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany, 20 January 2010.

Max Planck Research Group Symposium, Max Planck Society, Garching, Germany, 18 January 2010.

Department of Mechanical Engineering, University of Maryland, College Park, Maryland,

27 October 2009.

Department of Geology, University of Maryland, College Park, Maryland, 26 October 2009.

Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania, 14 July 2009.

Department of Geophysical Sciences, University of Chicago, Chicago, Illinois, 22 May 2009.

Department of Mechanical Engineering, California Institute of Technology, Pasadena, California, 17 March 2009.

Institute for Computational Engineering and Sciences, University of Texas at Austin, Austin, Texas, 23 February 2009.

Department of Atmospheric Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois, 26 March 2008.

Department of Mechanical Science & Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, 22 February 2008.

Department of Civil and Environmental Engineering, University of California at Davis, Davis, California, 12 December 2007.

Department of Geology, University of Illinois at Urbana-Champaign, Urbana, Illinois, 14 September 2007.

FUNDED
PROPOSALS

Title: An experimental investigation of conditions conducive to groove and ridge formation at Double-Layer-Ejecta (DLE) craters on Mars.

Participants: Susan W. Kieffer (PI), Pinaki Chakraborty (co-PI), and Joanna Austin (co-PI).

Duration: Jan 1, 2008 – Dec 31, 2010.

Budget: \$ 357,854

Sponsor: National Aeronautics and Space Agency. (Program: Mars Fundamental Research)

PROFESSIONAL
ACTIVITIES

Reviewer for: National Science Foundation.

Reviewer for: Physical Review Letters, Physical Review E, Physics of Fluids, Journal of Fluid Mechanics, Geophysical Research Letters, Journal of Geophysical Research, Earth and Planetary Science Letters, Journal of Fluids Engineering, American Institute of Aeronautics and Astronautics Journal, International Journal of Heat and Fluid Flow.

Co-Organizer and co-chair of session on Geological Fluid Dynamics in American Geophysical Union (AGU) Fall Meeting, San Francisco, California, December 2008.

Member of American Geophysical Union (AGU), American Physical Society (APS).