

**DAVID L. HU**  
**Assistant Professor**  
**The George W. Woodruff School of Mechanical Engineering**  
**July 17, 2012**

**I. EARNED DEGREES**

| <b>Degree</b>        | <b>Year</b> | <b>University</b>                     | <b>Field</b>                              | <b>Advisor</b> |
|----------------------|-------------|---------------------------------------|---|----------------|
| Doctor of Philosophy | 2005        | Massachusetts Institute of Technology | Mathematics                               | John Bush      |
| Bachelor of Science  | 2001        | Massachusetts Institute of Technology | Mechanical Engineering<br>(Minor in Math) | L. Mahadevan   |

**II. EMPLOYMENT**

| <b>Title</b>  | <b>Organization</b>  | <b>Years</b> |
|---|--|--------------|
| Assistant Professor<br>(3/4 appointment)                                    | Georgia Institute of Technology<br>School of Mechanical Engineering                              | 8/08-present |
| Assistant Professor<br>(1/4 appointment)                                    | Georgia Institute of Technology<br>School of Biology   | 8/08-present |
| Instructor of Mathematics   | Courant Institute of Mathematical<br>Sciences, New York University                               | 9/07-8/08    |
| National Science Foundation<br>Mathematical Sciences<br>Postdoctoral Fellow | Courant Institute of Mathematical<br>Sciences, New York University<br>(Advisor: Michael Shelley) | 9/05-08/07   |

**III. TEACHING**

**A. Individual Student Guidance**

**PhD Students Supervised**

- Name: Mlot, Nathaniel  
 Began Advising: Fall 2008  
 Project: Rheology of Ants  
 Status: Passed Qualifying exams in 2011, scheduled PhD proposal in 2012  
 Publications: Mlot, Tovey & Hu *PNAS* 2011; Mlot, Tovey & Hu 2012 *Comm.*  
*Integr. Biology*  
 Presentations: APS 2009; APS 2010; Fibers 2011
- Name: Marvi, Hamidreza  
 Began Advising: Spring 2009  
 Project: Locomotion of Snakes  
 Status: Passed Qualifying Exams in 2010; Passed PhD proposal in 2011; Completed all classes

- Publications: Marvi et al. *ASME DSSC Proceedings* (2011), Marvi & Hu  
(2012 *Proc. Roy. Soc Interface*)  
Presentations: APS 2010, DSSC 2011; SICB 2012; APS March 2012
3. Name: Dickerson, Andrew  
Began Advising: Spring 2009  
Project: Active water-repellency  
Status: Re-taking qualifying exams 2012  
Publications: Dickerson, Mills & Hu (*Proc Roy Soc Interface* 2012);  
Dickerson, Shankles, Madhavan 2012 *PNAS*  
Presentations: APS 2010; APS 2011; SICB 2012
4. Name: Amador, Guillerimo  
Began Advising: Fall 2010  
Project: Mechanics of seed dispersal  
Status: Taking qualifying exams 2012  
Publications: Amador & Hu (under review)  
Presentations: APS 2011
5. Name: Yang, Patricia  
Began Advising: Fall 2012  
Project: Rheology of Ants  
Status: Taking classes  
Publications: NA  
Presentations: NA

#### **M.S. Thesis Students Supervised<sup>1</sup>**

1. Name: Hobbs, William<sup>2</sup>  
Began Advising: Fall 2008  
Graduated: Winter 2009  
Thesis: Piezoelectric energy harvesting: vortex induced vibrations in plants, soap films and arrays of cylinders  
Publications/presentations: Hobbs & Hu *Fluid Struct. Interaction* 2011; APS 2009  
Position after graduation: Southern Company, Research Engineer
2. Name: Mulcahey, Thomas  
Began Advising: Fall 2008  
Graduated: Winter 2009  
Thesis: Autonomous cricket biosensors for acoustic localization  
Publications/presentations: SICB 2010  
Position after graduation: Georgia Tech Mechanical Engineering PhD program

#### **Undergraduate Special Problems and Research Students Supervised**

Six undergraduates have won university funding awards. Many have gone onto graduate school in science or engineering.

2012:

Puja De,

Jonathan Pham (CURE program awardee who spends 2 semesters in Hu's lab and 1 semester in

---

<sup>1</sup> Cited publications and contributions are in subsections of Section IV, unless otherwise noted

<sup>2</sup> Publications for M.S. students who also pursued their Ph.D. are listed under their Ph.D. entries.

Peking University),  
Alex Barberie,  
Abhishek Kwatra  
Michael Gerov,  
Paul Cook  
Eric Chang

2011:

Yasukuni Yamada (PURA),  
Daniel Christ (PURA),  
Camille Cruz (PURA),  
Peter Shankles,  
Nihar Madhavan (coauthor and high school student, currently at Princeton University)

2010:

Gregory Meyers, ``Scalybot.'' Publications: Marvi *et al.* 2011.  
Ishan Lal "A Mexican Jumping Bean Robot." Presidential Undergraduate Research Awardee (PURA)  
Daniel West, "Mechanics of Mexican jumping Beans." Presidential Undergraduate Research Awardee (PURA). Publications/presentations: SICB 2010, Position after graduation: Cummins Diesel and Fuel Systems, Pump Development Engineer.  
Micah Streiff  
Paul Foster, CT-scans of ant aggregations

2009:

Paul Richards "Mechanics of giant pumpkins." Publications/presentations: Hu, Richards, Alexeev (2011),  
Zachary Mills. "Mechanics of the wet-dog shake."  
Adrian Martinez, Position after graduation: Peace Corps  
Peter deMercurio (PURA)

2007-2008:

Kelly Sielert, 2007. "Turtle shell scaling" NYU Dean's Undergraduate Research Fellow (DURF);  
Michael Gordon. "Turtle shell scaling." NYU Dean's Undergraduate Research Fellow (DURF).  
Publications/presentations: Position after graduation: Master's program in Statistics at CUNY;  
Jasmine Nirody. "Mechanics of slithering" NYU Dean's Undergraduate Research Fellow (DURF). Publications/presentations: Hu *et al.* 2009. Position after graduation: Master's program at Boston University;  
Terri Scott. "Mechanics of slithering": Publications: Hu *et al.* 2009.

## **B. Courses Taught**

My recent efforts towards curriculum development are given below.

### **Graduate Courses**

Graduate fluid mechanics, ME 6601                      Fall 2011

I completely restructured this pre-existing course around a mathematical treatment of fluid mechanics with an emphasis on the use of scaling, Einstein notation, and physical intuition.

### **Undergraduate Courses**

Research Project Laboratory, BIO 4590:                      Spring 2010

I completely restructured this pre-existing course around a new theme on mechanics of

ant aggregations, created a semester's worth of new lectures and built new laboratory equipment for the course for the study of ant locomotion. Particular attention was paid to teaching biologists to perform quantitative mechanical measurements.

Fluid Mechanics, ME 3340: Fall 2008, Fall 2009

I taught this course with an emphasis on biomechanics and flows in nature. I introduced a new 2-week module on scaling and dimensional analysis and its use in nature.

Thermal Fluids Engineering, ME3720: Fall 2010

#### IV. INTELLECTUAL PRODUCTS<sup>3</sup>

##### A. Published Books and Parts of Books

1. Marvi, H. & Hu, D.L. *The role of functional surfaces in the locomotion of snakes*. Book proposal accepted by Springer. Editor: Ascheron, Claus. (publication planned in 2013)
2. Hu, D.L. & Shelley, M.J. Slithering locomotion. (2011) *Institute for Mathematics and its Applications Proceedings on "Natural Locomotion in Fluids and on Surfaces: Swimming, Flying, and Sliding"* University of Minnesota Press. June 1-5, 2010. Invited 15-page book chapter. Accepted in April 2011.

##### B. Refereed Publications

###### a. Refereed Journal Publications:

1. Dickerson, A., Mills, Z. & Hu, D. L. (2012) Wet mammals shake at tuned frequencies to dry. In press at *Proceedings of the Royal Society: Interface*.
2. Mlot N., Tovey, C. & Hu, D. L. (2012) Diffusive dynamics of large ant rafts. In press at *Communicative and Integrative Biology*.
3. Dickerson, A., Shankles, P., Madhavan, N., Hu, D. L. (2012) Mosquitoes survive raindrop collisions by virtue of their low mass. *Proceedings of the National Academy of Sciences, USA*. **109** (25) 9822-9827.
4. Marvi, H. & Hu, D. L. (2012) Concertina climbing of snakes. In press at *Proceedings of the Royal Society: Interface*.
5. Gravish, N., Franklin, S.V., Hu, D.L. & Daniel I. Goldman. (2012) Entangled granular media. *Physical Review Letters*. **108**, 208001 (journal cover)
6. West, D., Lal, I., Leamy, M. & Hu, D.L. (2012) Locomotion of Mexican Jumping Beans. *Bioinspiration and Biomimetics*. **7**: 036014 (12pp).
7. Hobbs, W. & Hu, D.L. (2012) Tree-inspired Piezoelectric Energy Harvesting. *Journal of Fluids and Structures*. **20**: 103-114.
8. Niu, J & Hu, D.L. (2011) Drag reduction of a hairy disk. *Physics of Fluids*. **23**: 101701 (4 pages).
9. Mlot, N., Tovey, C. & Hu, D.L. (2011) Fire ants self-assemble into waterproof rafts to survive floods. *Proceedings of the National Academy of Sciences, USA*. **108**: 7669-7673.
10. Hu, D.L., Sielert, K., Gordon, M. (2011) The strength of turtle shells and mammal skulls. *Journal of the Mechanics of Materials and Structures*. **6** (9-10): 1197-1211.
11. Hu, D.L. Richards, P. & Alexeev, A. (2011). Mechanics of giant pumpkins: how extreme weight determines shape. *International Journal of Nonlinear Science*. **46**: 637-647. (Highlighted on *National Public Radio* and *Smithsonian*)

---

<sup>3</sup> Underlined name indicates student of the PI

- Magazine)
12. Hu, D. L. & Bush, J. W. M. (2010) The hydrodynamics of water-walking arthropods. *Journal of Fluid Mechanics* **644**: 5-33  
(journal cover, highlighted in *Journal of Fluid Mechanics* **644**: 1-4).
  13. Hu., D. L., Nirody, J., Scott, T. & Shelley, M. J. (2009) The mechanics of slithering locomotion. *Proceedings of the National Academy of Sciences, USA*. **106**, 10081–10085. (Highlighted in *Nature* **459**, 919-920; *National Geographic*; *Smithsonian Magazine*; *The New York Times*; *National Public Radio*; *USA Today*; *Popular Mechanics*; *Scholastic Science World Special Issue* **66**, 4; *New Scientist* “Secrets of slithering lie in weight of the scales” June 13, 2009, p11 ).
  14. Hu, D. L., Goreau, T. & Bush, J. W. M. (2008) Flow visualization using tobacco mosaic virus. *Experiments in Fluids* **46**, 477–484.
  15. Hu, D. L., Prakash, M., Chan, B. & Bush, J. W. M. (2007) Water-walking devices. *Experiments in Fluids* **43**, 769–778.
  16. Bush, J. W. M., Hu, D. L. & Prakash, M. (2007) The Integument of Water-walking Arthropods: Form and Function. *Insect Mechanics and Control: Advances in Insect Physiology* **176**, 117–192.
  17. Bush, J. W. M. & Hu, D. L. (2006) Walking on water: Biocomotion at the interface. *Annual Reviews in Fluid Mechanics* **38**, 339–369.
  18. Hu, D. L. & Bush, J. W. M. (2005) Meniscus-climbing insects. *Nature* **437**, 733–736 (journal cover, highlighted in *What’s happening in the mathematical sciences*. **6**, 87-93; *The New York Times*)
  19. Hu, D. L., Mendel, L., Chan, B., Goreau, T. & Bush, J. W. M. (2005) Visualization of a fish wake using tobacco mosaic virus. *Physics of Fluids* **17**, 0991103.
  20. Hu, D. L., Chan, B. & Bush, J. W. M. (2003) The hydrodynamics of water strider locomotion. *Nature* **424**, 663–666 (journal cover, highlighted in *Nature* **424**, 621-622; *The Scientist* **92**, 366; *Discover* **24**, 11. *The Washington Post*, *The Times*, *The Economist*; *The New York Times*; *Discover* by Fenella Saunders p 18. *Science Dong-A* Sept 2003, p26-33; *The Scientist* Sizing up Nature’s Denizens Feature article. **17** (19) 18-20; *Exploratopia* “More than 300 kid-friendly experiments and explorations for curious minds” Water tight. Cover and p107-108).
  21. Hu, D. L., Chan, B. & Bush, J. W. M. (2003) Water-walking. *Physics of Fluids* **15**, S10.
  22. Greenawald, E. C., Levenberry, L. J., Poranski, C. F., Everett, R. K., Simmonds, K. E., Batra, N. K. & Hu, D.L. (1997) X-ray backscatter evaluation of porosity distribution in low density porous magnesium. *Reviews of Progress in Quantitative Non-destructive Evaluation* **16**, 1495-1501.

**b. Refereed Conference Publications:**<sup>4</sup>

1. Hu, D.L. & Shelley, M. J. (2008) “Snakeskin and snake locomotion” Proceedings of the first ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems. Ellicott City, MD.
2. Marvi, H., Meyers, G., Russell, G. & Hu, D.L. (2011) Scalybot: a snake-inspired robot with active frictional anisotropy. *ASME Dynamic Systems and Control Conference Proceedings*. Accepted 2011.

---

<sup>4</sup> Most refereed conference publications were developed into archival journal publications, and appear under section IV.B.a.

**c. Submitted Refereed Publications:**

23. Amador, G., Yamada, Y., Hu, D. L. Hydrodynamics of splash-cup seed dispersal. Under review since Dec 2011.

**C. Other Publications**

1. Bush, J. W. M. & Hu, D. L. (2004) Walking on water. In *Multimedia Fluid mechanics CD* (ed. G. M. Homsy). Cambridge: Cambridge University Press.
2. Bush, J. W. M. & Hu, D. L. (2010). Walking on water in *McGraw-Hill Yearbook of Science and Technology*. Ed: J. Weill. 409-412. This annually published text is described as “Approximately 150 articles from 200 leaders in their respective fields cover technical disciplines from Agriculture to Zoology”
3. Bush, J. W. M. & Hu, D. L. 2010 Walking on water. *Physics Today* **63**, 62–63.
4. Goldman, D. I. & Hu, D. L. 2010 Wiggling through the world. *American Scientist* **98**, 314–323.
5. Hu, D.L. (2012) Electromechanics for the Twenty-first century. *Bioscience*. **62** (1): 94-95.

**D. Presentations/Seminars**

**Invited University Seminars**

1. Haverford College. Departments of Physics and Biology, in conjunction with the Distinguished Visitors Program. *Ant rafts and other water-repellent systems*. Host: Jerry Gollub. Haverford, Pennsylvania. February 9, 2012
2. Temple University. Department of Biology. *Ant rafts and other water-repellent systems*. Host Tonia Hsieh. Philadelphia, Pennsylvania. February 8, 2012
3. University of Toronto. Department of Mechanical and Industrial Engineering. *Ant rafts and other water-repellent systems*. Host: Markus Bussman. Toronto, Canada. September 2, 2011.
4. Kyung Hee University. Department of Applied Mathematics. *Bio-inspiration from water-repellent insects*. Host: Hyea Hyun Kim. Bundang, Korea. June 24, 2011.
5. Korea Institute Machinery & Materials (KIMM). Nanoconvergence Division. *Active and passive water-repellency in nature*. Host: Hyuneui Lim. Daejeon, Korea. June 27, 2011.
6. Korea Advanced Institute of Science and Technology (KAIST). *Ant rafts and other water-repellent biological systems*. Host: Sang Yong Lee. Daejeon, Korea. June 28, 2011.
7. Korea Institute of Science and Technology (KIST). *Water-repellent adaptations: surface structure and behavior*. Host: Myoung-Woon Moon. Seoul, Korea. June 29, 2011.
8. National Korean University. *Water-repellency among insects*. Host: Sid Chung. Seoul, Korea. June 30, 2011.
9. Seoul National University. School of Mechanical and Aerospace Engineering, Center for Biomimetic Mechanical Systems. *Walking on water: water-repellent adaptations among insects*. I was one of 6 invited international speakers. Host: Ho-Young Kim. Seoul, Korea. July 1, 2011.
10. Purdue University. School of Mechanical Engineering. Mechanical Engineering Special Seminar. *Walking and floating on water: ant rafts and other water-repellent systems*. Host: X. Ding. West Lafayette, Indiana. May 16, 2011
11. University of Delaware. Department of Mathematical Sciences. Applied Mathematics Seminar. *Biological micro-fluidics: lessons from insects*. Host: P. Fok. Newark, Delaware. December 2010.

12. George Washington University. Department of Mechanical and Aerospace Engineering. MAE Seminar. *Capillary biology: lessons from insects*. Host: J. Lee. Washington, D.C., December 2010.
13. University of Georgia. Nanoscale Science and Engineering Center. NanoSEC Seminar. *Capillarity: lessons from insects*. Host: Z. Pan. Athens, Georgia. December 2010.
14. University of Pennsylvania. Mechanical Engineering and Applied Mechanics (MEAM). General Robotics, Automation, Sensing & Perception Laboratory Seminar. *Robotic applications of snake locomotion*. Host: M. Yim. Philadelphia, Pennsylvania. June 2010.
15. Tufts University. Department of Biology. Tufts Biomimetic Devices Laboratory Seminar. *Mechanics of snake locomotion*. Host: B. Trimmer. Medford, Massachusetts. March 2010.
16. Georgia Institute of Technology. School of Mathematics. Applied and Computational Mathematics Seminar. *Locomotion at interfaces: snakes and ants*. Host: S. Alben. Atlanta, Georgia. November 2009.
17. Georgia Institute of Technology. School of Physics. Physics Colloquium. *Snake locomotion*. Host: A. Fernandez de Las Nieves. Atlanta, Georgia. November 2009.
18. Georgia Institute of Technology. School of Applied Physiology. *How snakes move using friction*. Host: T. Burkholder. Atlanta, Georgia. October 2009
19. National Chung Hsing University. Department of Physics. Biophysics Journal Club. *Structural strength in biology*. Host: Kai-Jung Chi. Tai Chung, Taiwan. May 2009.
20. Chinese Academy of Sciences. Institute of Chemistry. *Hydrophobicity and Locomotion*. Host: Lei Jiang. Beijing, China. April 2009.
21. Tsinghua University. Department of Chemistry. *Water-repellency and Locomotion*. Host: Xi Zhang. Beijing, China. April 2009.
22. University of Maryland at College Park. Department of Physics. Applied Dynamics Seminar. *Snakes on a Plane*. Host: W Losert. College Park, MD. December 2008.
23. University of Arizona. Department of Mathematics. Modeling and Computation Seminar. *How Snakes Slither and How Shells Break*. Host: A Goriely. Tuscon, AZ. November 2008.
24. University of California, Berkeley. Department of Biology. Animal Flight Laboratory Seminar Series. *Shell strength*. Host: R Dudley. Berkeley, CA. October 2008.
25. Harvard University. Department of Biology. Concord Field Station Integrative Graduate Education and Research Traineeship (IGERT) Seminar. *Hydrodynamics of walking on water*. Host: A Biewener. Cambridge, MA. April 2008.
26. University of Maryland at College Park. Department of Mathematics. Partial Differential Equation (PDE) / Applied Math Seminar. *Snake Locomotion*. Host: P. Shipman. April 2008.
27. Worcester Polytechnic Institute. Department of Physics. Physics Colloquium. *Water-walking insects*. Host: S. Koehler. Worcester, MA. March 2008.
28. Arizona State University (Polytechnic Campus). Applied Mathematics Job Talk. Mathematics. *Walking on water*. Host: M. Zandieh. Phoenix, AZ. March 2008.
29. University of Pittsburgh. Mechanical Engineering. Mechanical Engineering and Materials Science Department Seminar. *Walking on water and slithering on land*. Host: L. Schaefer. Pittsburgh, PA. March 2008.
30. University of Saskatchewan. Department of Mathematics and Statistics. Mathematics Colloquium. *Snake locomotion* Host: R. Srinivisan. Saskatchewan, Canada. March 2008.

31. Georgia Institute of Technology. School of Mechanical Engineering. *Snakes on a Plane*. Atlanta, GA. February 2008.
32. Montclair State University. Department of Mathematical Sciences. Departmental Seminar. *Snakes on a Plane*. Host: P. Yecko. Montclair, NJ. February 2008.
33. Colorado State University. Mathematics Department. Mathematics Colloquium. *Snakes on a Plane*. Host: S. Tavener. Fort Collins, CO. February 2008.
34. Colorado State University. Bioagricultural Sciences & Pest Management (BSPM). *How to walk on water*. Host: D. Mykles. Fort Collins, CO. March 2008.
35. Carnegie Mellon University. Mechanical Engineering. Departmental Seminar. *Snakes on a Plane*. Host: N. Aubry. Pittsburgh, PA. February 2008.
36. Virginia Polytechnic Institute and State University (Virginia Tech). Department of Engineering Science and Mechanics (ESM). Departmental Seminar. *Snakes on a Plane*. Host: M. Hajj. February 2008.
37. Michigan State University. Mathematics Department. Departmental Seminar. "Snakes on a Plane" Host: C. Chiu. East Lansing, MI. February 2008.
38. Indiana University. The Biocomplexity Institute and Physics Department. Biocomplexity seminar series. *Walking on water*. Host: J Glazier. Bloomington, IN. February 2008.
39. University of California, Los Angeles (UCLA). Mathematics Department. Departmental Seminar. "Snakes on a Plane" Host: A. Bertozzi. Los Angeles, CA. Jan 2008.
40. Massachusetts Institute of Technology. Department of Mathematics. Brown bag seminar series. *Snakes on a Plane*. Host: J. Bush. Cambridge, MA. December 2007.
41. Princeton University. Mechanical and Aerospace Engineering. Dynamics Seminar. *Snakes on a Plane*. Host: P Holmes. Princeton, New Jersey. November 2007.
42. Colgate University. Physics Department. Science Colloquium. *Walking on water*. Host: B. Parks. Hamilton, NY. November 2007
43. Academia Sinica. Physics Department. Dynamical Systems Seminar Series. *Walking on water*. Host: Keng-Hui Lin. Taipei, Taiwan. November 2007. Chiao Tung University. Department of Applied Mathematics. Departmental Seminar. *Walking on water*. Host: Ming-Chih Lai. Hsinchu, Taiwan. November 2007.
44. Chung-Hsing University. One of four invited speakers for a Biophysics workshop. Taught 2 lectures as part of a 3-day interdisciplinary workshop in biology and physics to over 100 Taiwanese faculty, graduate and undergraduate students. Host: Kai-Jung Chi. Taipei, Taiwan. November 2007
45. Georgia Institute of Technology. Department of Biology. Biologically inspired Design Seminar Series. *Walking on water*. Host: J Yen. Atlanta, GA. October 2007.
46. Cornell University. Department of Theoretical and Applied Mechanics. Machines and Organisms Seminar Series. *Snake locomotion*. Host: A Ruina. Ithaca, NY. September 2007.
47. University of California, Berkeley. Department of Biology. Dudley, Full and Koehl Lab Seminar. *Hydrodynamics of walking on water*. Host: Dudley. Berkeley, CA. May 2007.
48. Pennsylvania State University. Materials Science and Engineering Department. Polymer Physics Seminar. *Studies in Biocomotion*. Host: R. Colby. January 2007.
49. New Jersey Institute of Technology. Department of Mathematics. Fluid dynamics Seminar. *Fluid mechanics of water striders*. Host: Y. Young. Newark, NJ. December 2006.



50. Cornell University. Department of Theoretical and Applied Mechanics. Machines and Organisms Seminar Series. *The hydrodynamics of water striders*. Host: Z. Wang. Ithaca, NY. March 2003.

### **b. Workshop Organization**

1. Pohang University of Science and Technology. Department of Mechanical Engineering. I organized and taught a 6-hour workshop entitled *Complex biological surfaces and locomotion* to 28 faculty and students. Topics covered included: walking on water, snake locomotion and cooperation of ants. Tools taught included: animal experiments (visualization, tracking kinematics), mathematical modeling (differential equations, mechanics), scaling arguments (limits in force, mass, size), biological diversity (mega-charts) and simple robots (satisfying physical constraints). Host: Sang Joon Lee. Pohang, Korea. June 24, 2011.

### **c. Contributed Conference Presentations**

1. Hu, D.L. Surfaces for reducing adhesion and friction. Locomotion Systems Science. NSF and ARL funded workshop organized by Dan Goldman. May 2012.
2. Marvi, H., Streater, J. & Hu, D.L. "Snakeskin Tribology: How Snakes Generate Large Frictional Anisotropy," *APS March Meeting*, Boston, MA, February 2012.
3. Dickerson, A., Mills, Z. & Hu, D.L. "Wet mammals shake at tuned frequencies to dry." *Society for Integrative and Comparative Biology Annual Meeting*. Charleston, SC. January 2012.
4. Dickerson, A., Shankles, P., Madhavan, N., & Hu, D.L. "How insects fly in the rain." *Society for Integrative and Comparative Biology Annual Meeting*. Charleston, SC. January 2012.
5. Marvi, H., Cook, P., & Hu, D.L. "Rectilinear locomotion and the design of Scalybot 2" *Society for Integrative and Comparative Biology Annual Meeting*. Charleston, SC. January 2012.
6. Marvi, H., Meyers, G., Russell, G. & Hu, D.L. "Scalybot: a snake-inspired robot with active frictional anisotropy" ASME Dynamic Systems and Control Conference. Arlington, VA. November 2011
7. Hu, D. & Niu, J. "Drag reduction of a hairy disk." *American Physical Society 64<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics*. Baltimore, MD. November 2011.
8. Dickerson, A., Shankles, P., Madhavan, N., & Hu, D.L. "How mosquitoes fly in the rain." *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Baltimore, MD. November 2011.
9. Amador, G., Yamada, Y., Hu, D. L. Hydrodynamics of splash-cup seed dispersal. *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Baltimore, MD. November 2011.
10. Gravish, N., Franklin, S.V., Hu, D.L., & Goldman, D. I. "Packing and stability of geometrically cohesive granular media" *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Baltimore, MD. November 2011.
11. Mlot, N., Foster, P., Streiff, M, Hu, D.L. Ant-Tex: 3-D Visualization of the Water-Repellent Network of Fire Ants. *International Symposium on New Frontiers in Fiber Materials Science*. October 11–13, 2011.
12. Hu, D., Mlot, N. & Tovey, C. "The ant raft: a self-assembly hydrophobic surface." 48th Annual Technical Conference of the Society of Engineering Sciences (SES2011) held October 12-14, 2011 at Northwestern University, Evanston, IL. Invited speaker by A.

Adrekani.

13. Nick Gravish, Geoffrey Russell, Scott Franklin, David Hu, Dan Goldman. "Vibrofluidized melting of geometrically cohesive granular media." *American Physical Society March Meeting*. Dallas, TX. March, 2010.
14. Mlot, N., Shinotsuka, S. & Hu, D.L. "Ant Towers and Adhesion Force." *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Long Beach, CA. November 2010.
15. Dickerson, A., Mills, Z. & Hu, D.L. "Wet dog shake." *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Long Beach, CA. November 2010.
16. Vistarakula, K.C., Bergin, M. & Hu, D.L. "Filtration by eyelashes." *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Long Beach, CA. November 2010.
17. Marvi, H. & Hu, D.L. "Concertina locomotion of snakes." *American Physical Society 63<sup>rd</sup> Annual Meeting of the Division of Fluid Dynamics*. Long Beach, CA. November 2010.
18. Dickerson, A. & Hu, D.L. "Capillary cleaning and the wet-dog shake." *Natural Locomotion in Fluids and on Surfaces: Swimming, Flying and Sliding*. Institute for Mathematics and Its Applications (IMA). June 2010.
19. Shelley, M.J. & Hu, D.L. "Snakes crawling and worms pushing on surfaces." *Natural Locomotion in Fluids and on Surfaces: Swimming, Flying and Sliding*. Institute for Mathematics and Its Applications (IMA). June 2010.
20. Hu, D.L. & Mlot, N. "The ant raft: cooperative flotation and self-assembly." *Society for Integrative and Comparative Biology Annual Meeting*. Seattle, WA. January 2010.
21. West, D. & Hu, D.L. "Thermotaxis of Mexican jumping beans." *Society for Integrative and Comparative Biology Annual Meeting*. Seattle, WA. January 2010.
22. Mulcahey, T., Weissburg, M., Sabra, K. & Hu, D.L. "Autonomous Cricket Biosensors for Acoustic Detection." *Society for Integrative and Comparative Biology Annual Meeting*. Seattle, WA. January 2010.
23. Hu, D.L. & N. Mlot. "Swarming on the water surface." *Georgia Tech Workshop. Microbes to Metazoans: regulation, dynamics and evolution of social behavior*. 30-min Invited talk. Atlanta, GA. November 2009.
24. Hu, D.L. & Alexeev, A. "Giant Pumpkins: Plasticity-mediated plant growth." *American Physical Society 62<sup>nd</sup> Annual Meeting of the Division of Fluid Dynamics*. Minneapolis, MN. November 2009.
25. Mlot, N., Breedveld V. & Hu, D.L. "The Ant Raft." *American Physical Society 62<sup>nd</sup> Annual Meeting of the Division of Fluid Dynamics*. Minneapolis, MN. November 2009.
26. Hobbs, W. & Hu, D.L. "Tree-inspired Piezoelectric Energy Harvesting." *American Physical Society 62<sup>nd</sup> Annual Meeting of the Division of Fluid Dynamics*. Minneapolis, MN. November 2009.
27. Hu, D.L. & Shelley, M.J. "The mechanics of slithering." National Tsing-Hua University. *Interdisciplinary Conference on Applied Analysis and Mathematics*. Invited speaker. Hsinchu, Taiwan. May 2009.
28. Hu, D.L. & Shelley M.J. "Large and limbless." *American Physical Society March Meeting*. Invited talk. New Orleans, LA. March 2008.
29. Hu, D.L. & Sielert, K. "The strength of animal and plant shells." *Society of Integrative and*

- Comparative Biology Annual Meeting*. San Antonio, TX. January 2008.
30. Hu, D.L. & Shelley, M.J. “The mechanics of slithering.” *Society of Integrative and Comparative Biology Annual Meeting*. Phoenix, AZ. January 2007.
  31. Hu, D.L. & Shelley, M.J. “The locomotion of snakes.” *American Physical Society March Meeting*. Denver, CO. March 2007.
  32. Hu, D.L. & Bush, J.W.M. “The hair layer of water-walking insects.” *American Physical Society 58<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics*. Chicago, IL. November 2005.
  33. Hu, D.L. & Bush, J.W.M. “The hydrodynamics of water-walkers.” *American Physical Society 57<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics*. Seattle, WA. November 2004.
  34. Hu, D.L., Kreider, T. & Bush, J.W.M. APS DFD. “Meniscus-climbing insects.” *American Physical Society 56<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics*. East Rutherford, New Jersey. Nov 2003.
  35. Hu, D.L. & Bush, J.W.M. “The hydrodynamics of water strider locomotion.” *American Physical Society 55<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics*. Dallas, TX. Nov 2003.

## V. SERVICE

### A. Professional Contributions

#### a. Reviewer for Scientific Journals

I review more than 12 articles per year from over 20 serials, including *Nature*, *Nature Communications*, and *PNAS* as well as journals of chemistry, biology, mathematics, robotics, engineering and general sciences:

ACS Applied Materials & Interfaces (2011), Annals of Biomedical Engineering  
Applied Physics Letters, Biology Letters (2010), Biophysical Journal (2011)  
Central European Journal of Biology, Evolution (2010), Entomologia Experimentalis et  
Applicata IEEE Transactions on Robotics, IEEE Transactions on Automatic Control  
Insectes Sociaux (2012), Journal of Experimental Biology (2011, 2012), Journal of  
Experimental Mechanics, Journal of the Royal Society Interface (2011), Langmuir  
Nanoscale (The Royal Society of Chemistry) 2011, Nature Communications  
Nature, Naturwissenschaften (2011), Physical Review E: Statistical, nonlinear and soft matter  
physics, PLoS ONE (2012), Proceedings of the National Academy of Sciences, USA (2009,  
2011, 2012), Proceedings of the Institution of Mechanical Engineers, Part C, Journal of  
Mechanical Engineering Science (2011), Proceedings of the Royal Society A: Mathematical,  
Physical and Engineering Sciences, Robotica (2011), SIAM Review (Society for Industrial  
and Applied Mathematics) (2011)

#### b. Reviewer for Funding Agencies

National Research Foundation of Korea. Global Research Network Program, which supports  
collaborative research between Korean scholars and their overseas counterparts.

Contact: Cheolho Kang, 2011

American Society for Engineering Education, Scholarship for SMART (Science,  
Mathematics & Research for Transformation). Panel, 2011

National Science Foundation, Division of Biology. Integrative and Organismal Systems.

Contact: W. Zamer, 2010, 2011

National Science Foundation, Division of Biology. Integrative and Organismal Systems.

Physiological and Structural Systems Cluster, Contact: A. Summers, 2009  
National Science Foundation Graduate Research Fellowship Program, Biochemistry,  
Biophysics & Structural Biology Panel. Contact: Enoch Baldwin, January 11-13, 2012  
Department of Defense (DoD) and the American Society for Engineering Education (ASEE),  
National Defense Science and Engineering Graduate (NDSEG) Fellowship evaluation  
meeting, Mathematics Panel, February 25-26, 2012

### **c. Society Memberships and Activities/ Conference Organization**

Society for Integrative and Comparative Biology  
Session chair, Exotic morphology. *Society for Integrative and Comparative Biology  
Annual Meeting*. Seattle, WA. January 2010  
Session chair, Complementary to Symposium: Modeling Animal Locomotion III, January  
2012

American Physical Society, 2002 – present  
Session chair, Drop Experiments, American Physical Society 64th Annual Meeting of the  
Division of Fluid Dynamics. Baltimore, MD. November 2011

Society for Engineering Science, 2011-present  
Session co-chair, Biocomotion and Biofluid Dynamics Symposium. *Society of  
Engineering Science 2011 Annual Technical Conference*. Evanston, IL. October 2011

American Society of Mechanical Engineers  
1. Abstract Reviewer & Session chair, Development and Characterization of Bio-Inspired  
Structures I. ASME 2008 Conference on Smart Materials, Adaptive Structures and  
Intelligent Systems. Ellicott City, MD. October 2008  
2. Abstract Reviewer for ASME Summer Bioengineering Conference. Fajardo, Puerto  
Rico. June 2012.

Tau Beta Pi Engineering Honor Society, 2000 – 2001

### **B. Campus Contributions**

#### **Institute-wide**

2<sup>nd</sup> annual TedX Georgia Tech speaker (1 of 6) at the Academy of Medicine. Host: Sharad  
Gopal Apr 7, 2012  
Georgia Tech Chapter of Society of Asian Scientists and Engineers  
Faculty advisor 08/10 to present  
Georgia Tech Tzu Chi Foundation Chapter  
Faculty advisor 02/12 to present  
“Ramblin’ Reck” Homecoming Parade Official Judge (elected by students) 2009  
UROPSymposium, Judge 2010

#### **Contributions to Departments outside of Mechanical Engineering**

Bioengineering Program Faculty: courtesy appointment 2009-present  
Biomedical Engineering Department: courtesy appointment 2009-present  
Center for Bio-Inspired Design (CBID), member 2008-present  
Member of Qualifying Exam Committee for bioengineering 2012-present

### **Contributions in Mechanical Engineering**

|  |  |
|--|--|
| Graduate Orientation for Thermal-Fluid Sciences (1 hour lecture) | 2009, 2010, 2011                             |
| Member of Graduate Committee                                     | 08/08 – present                              |
| Member of Qualifying Exam Committee for mathematics              | Fall 2008                                    |
| Member of Qualifying Exam Committee for fluid mechanics          | Fall 2009, Spring 2009,<br>Fall 2010-present |

### **Ph.D. Reading Committee Memberships**

1. Abtin Rahimian, CS, Proposal presented in March 2011; defended in Feb 2012
2. Hamidreza Marvi, ME, Proposal presented in May 2011
3. David Murphy, Civil E., Proposal presented in June 2011; defended July 2012
4. Yang Ding, Physics, Thesis defended on Oct 31, 2011
5. Hassan Massoud, ME, Proposal to be presented in Spring 2012; defended July 2012

### **M.S. Reading Committee Memberships**

1. William Hobbs, ME, Winter 2010 (chair)
2. Thomas Mulcahey, ME, Winter 2010 (chair)
3. Rajat Ghosh (Alexeev, ME) Spring 2010

## **C. Other Contributions**

### **a. Invited guest on Television, Movie, and Radio shows**

My group has been interviewed for the following media segments. Nearly all segments can be found by Googling the title of the article or on Hu's lab website: <http://www.me.gatech.edu/hu/>

1. **Mosquitoes flying in the rain.** The Weather Channel. Show: "Your Weather Today" with Mike Bettes. "Mosquitoes and rain: science behind flight" Discover magazine. Print/Online: June 4, 2012, USA Today, "How do mosquitoes survive collisions with raindrops?" Doyle Rice June 4, 2012, LA Times, "Why don't mosquitoes die in the rain? They're too small" June 4, 2012, Christian Science Monitor, "How military might benefit from study of hard-to-kill mosquitoes" June 4, 2012, Scientific American, "How the Mosquito Survives Collisions with Raindrops [video]" June 4, 2012, Science AAAS, "Raindrops Don't Swat Down Mosquitoes" June 4, 2012, Science News, "How a mosquito survives a raindrop hit" June 4, 2012, Fox News, "Why raindrops don't kill mosquitoes" June 5, 2012, LiveScience, "How Tiny Mosquitoes Survive Raindrops' Blow" June 5, 2012, New York Times, "For Mosquitoes, a Hard Rain Isn't a Flight Risk" June 5, 2012, NPR, "Splish Splat? Why Raindrops Don't Kill Mosquitoes," Robert Harris. June, 5, 2012, Nature, "Mosquitoes don't let the rain get them down" June 5, 2012, Daily Mail, "Video shows off how a mosquito stays in the air after being hit by a drop of water 50 times its size. June, 5, 2012, BBC Nature, "How tiny insects survive the rain" June 5, 2012, Yahoo News, "New study on mosquitoes and raindrops could change the future of robotics" June 5, 2012, Huffington Post, "How Bloodsuckers Stay Aloft After Water Drop Collision" June 6, 2012, International Business Times, "Mosquito vs. Raindrops: How the Tiny Pests Survive Head-On Collisions" June 7, 2012, Discover, "Mosquitoes' Clever Little Trick to Survive Collisions With Raindrops: Being Little" June 16, 2012, The Citizen, "Study on mosquitoes could change the future of robotics" June 17, 2012, Charlotte Observer, "Do raindrops crush mosquitoes? Think again" June 19, 2012, Washington Post, "Raindrops don't swat down mosquitoes" Today's Science on File (Facts on File). Robert Stoll. Audobon. Catherine Griffin Popular Mechanics The Scientist. Hayley Dunning. Photo of the Day and most popular post of the day. International: June 18, 2012, LeMonde, "Pourquoi les gouttes de pluie n'ecrasent pas le moustique." Austrian Broadcasting Corporation. Robert Czepel. Australia -

Stephen Hutcheon. Brazil - *Ciência Hoje das Crianças* - Fernanda Turino. Brazil - *Folhinha*, the supplement for children at *Folha de São Paulo*. Luisa Massarani. Denmark - *Ud & Se*. Kristoffer Lottrup. Finland - Finnish popular science magazine *Tiede*. Mikko Puttonen. France - *Science et Vie*. Audrey Dufour. France - *Biofutur*. Safi Douhi. Germany - *Naturwissenschaftliche Rundschau* (cover). Klaus Rehfeld. Germany - *Stern*. Astrid Viciano. Germany - *Der Spiegel* .magazine. Jörg Blech. Germany - West German Broadcasting Station, WDR. Monika Kunze. Norway - [www.forskning.no](http://www.forskning.no). Arnfinn Christensen. Spain - *La Razón*, a Spanish national newspaper. Belen Tobalina.

Radio: June 5, 2012. Westdeutscher Rundfunk and magazine "Leonardo" with Rainer Langen. 5 min. June 5, 2012. National Public Radio Morning Edition with Richard Harris. 1 min. June 5, 2012. BBC World Service with host Giles Dilnot. 5 min. June 6, 2012. CBC North Radio - Yellowknife. Show: *The Trailbreaker*, Host: Joslyn Oosenbrug. 5 min. June 8, 2012. *Mooney Goes Wild*, a weekly Science & Wildlife radio show on RTE Radio One, Ireland's National Broadcaster. Host: Katriona McFadden. 15 min. June 24, 2012. National Academy of Engineering with WTOP news. Randy Atkins. 1 min. TV June 4, 2012. Fox News. Alec Liu. French TV programme "Le Magazine de la Santé" / "Health Magazine" which is daily broadcasted on the France 5 channel (an educative channel). Host: David Zavaglia. June 11, 2012. CBS San Francisco, KCBS with Stan Bunger and Susan Leigh Taylor. 5 min.

2. **Ant rafts.** April 25<sup>th</sup>, 2011. *Discover Magazine*. "Fire ants assemble into living waterproof rafts." Ed Yong. April 26<sup>th</sup>, 2011. *Geek.com*. "Fire ant floating rafts study may lead to better waterproof materials/robot behavior." Matthew Humphries. April 25, 2011. *InsideScience.org*. "Fire Ants Assemble as a 'Super-Organism'." Katharine Gammon. April 25<sup>th</sup> 2011. *National Geographic Daily News*. "Pictures: Fire Ant Swarms Form Living Life Rafts." April 26, 2011. *Nature News*. "Ants team up to stay dry." Lizzie Buchen. April 2011. *National Public Radio Online Blog*. "Water Can't Put Out a Fire-Ant Raft." Jonathan Makiri. April 2011. *NPR Science Friday*. Short radio segment. April 2011. *Quirks & Quarks*. Short Radio Segment with Bob McDonald. April 26, 2011. *Popular Science*. "Fire Ants Behave Like: Gore-Tex, a Liquid, a Woven Material, and a Waterproof Raft." Dan Nosowitz. April 2011. *Reuters*. "Fire ants form rafts to defy floods." Popular video of the day. April 25, 2011. *Science*. "Fire Ants Surf Floods on Rafts of Their Own Bodies." Catherine Meyers. April 26, 2011. *Scientific American*. "Ferry Tale: Fire Ants Aggregate into Living Rafts to Escape Floods." Nina Bai. April 2011. *Scientific American podcast*. April 25, 2011. *The Guardian UK*. "Fire ants stick together to sail through stormy weather." Ian Sample. April 25, 2011. *The Washington Post*. "The incredible floating fire ant." Front page article. Brian Vastag. April 25, 2011. *Wired Science*. "Ant Rafts Repel Water Like Gore-Tex." Lisa Grossman. "Fire Ants 3D: The Invincible Army": Produced and Directed by Michael Watchulonis. Worldwide release date for 3D TV is 12/1/11.
3. **Wet dog shake.** Nov 2010. *National Public Radio*. All Things Considered. 2-minute segment. Nov 2010. *Good Morning America*. 5-minute segment. "The Wet Dog Shake: Scientists Uncover Secret." *CBC's Quirks & Quarks*, Host Jim LeBans on Oct 2010. *Popular Science*. Oct 2010. *Science News*. "Doing the Wet-Dog Wiggle." Alexandria Witze. Oct 2010. *Neatorama*. "How Fast Should a Wet Dog Shake to Get Dry?" John Farrier. Oct 2010. *Technology Review*. "Physicists Discover Universal 'Wet-Dog Shake' Rule." Oct 2010. *Wired UK*. "Physics of Wet Dogs Shake Out in High-Speed Videos." Duncan Geere. Oct 2010. *Discover Magazine* (online). Oct 2010. *ABC News online*. "The Wet Dog Shake: Scientists Uncover Secret." Ki Mae Heussner. Oct 2010. *Discovery Channel Canada*. Slo-Mo Tuesdays. Nov 2010. *Discovery News*. "The Wet Dog Shake: Physics Revealed." Jennifer Viegas. Nov 2010. "Как отряхиваются собаки?". Nov 2010. *Gizmag*. "Scientists shake up fluid dynamics of wet dogs." Grant Banks. Mar 2011. *Popular Mechanics*. Mar 2011. *Know Magazine*. "How Much Shake Should a Wet Dog

Make?"

4. **Giant Pumpkins.** Nov 2010. *USA Today*. Dec 2010 science section for *NRC Handelsblad* a Dutch National Newspaper, written by Carola Houtekamer. Science News: "Supersizing pumpkins: Engineers model extreme growth in fruits" by Alexandera Witze, Oct 2010. Oct 2010: Physics of giant pumpkins on NPR, by Flor Lichthman. Oct 2010 CBS Atlanta and CNN. *Smithsonian Magazine* by Brendan Borrell.
5. **Snake locomotion.** June 2009. *Discover Channel Canada* television show Daily Planet 5-minute film. June 2009 *National Academy of Engineering* show on WTOP, Washington's news and traffic station, "Snake Secrets" 40-second radio segment. Host: Randy Atkins. June 2009. *National Science Foundation* film "The Secret of a Snake's Slither" Produced by Lisa Raffensperger. June 2009. *National Science Foundation* show "Science Nation". 5-minute film on snake experiments and interview. June 2009. *National Public Radio* show "Science Friday". 5-minute description of work played to US audiences. Online video voted Most Watched of the Week. Produced by Flora Leichtman. June 2009. British Broadcasting Company show "Drive". 5-minute live interview to UK
6. **Water striders.** July 2006. *VPRO* Dutch Public Television show. "Lopen over Water." 40-minute film. Produced by Karin Schagen. July 2005. *Discover Channel Canada* television show Daily Planet. "Walking on water" 5-minute film. Produced by Maria Sotiropoulos and Dennis Porter.

I also provided commentary for various news articles such as:

- Hydrophobicity of Mosquitoes: Multifaceted Menace. *Science* **317**:301 (2007).
- National Public Radio, Cat drinking, 2010
- Insect drinking, Technology Review, MIT News, Jennifer Chu, October 2011

#### **b. Cover artwork contributions**

Experiment flow visualizations from our lab have been used as cover art for numerous scientific and engineering textbooks as well as books/album covers for the general public.

- Cover photo for Munson, Young, Okiishi & Heubsch *Fundamentals of Fluid Mechanics*. Edition: 6<sup>th</sup>. Don Fowley, 2009.
- Album cover photo for Australian Experimental/Post Metal band "Meniscus", single "Absence of I" 2007.
- Cover photo for Zufall, Selbstorganisation und die Entstehung des Lebens" edited from the Studiengemeinschaft Wort und Wissen, written in German (book title in translation: "Chance, self-organization and the origin of life"

#### **c. Hosting of high school teachers/international guests**

**GIFT (Georgia Internship for Teachers)** Program. Summer 2010. We hosted a high-school teacher, Sameela Reed, in our lab for 4 weeks and co-wrote an educational module entitled "Snakes on a Plane" for 8<sup>th</sup>-graders.

**KITES (Kids Interested in Technology, Engineering, and Science)** Program, April 27, 2012. I hosted KITES founder Marlene Reynolds to Georgia Tech to meet faculty. Our group presented at 3 booths at the annual KITES festival.

Name: Niu, Jun

Began Advising: Fall 2010  
Project: Mechanics of the hairy coatings  
Status: 3rd-year PhD student visiting our lab, supported by the  
China Scholarship Council, associated with the Ministry of Education of the P. R. China.  
Publications: Niu & Hu Phys. Fluids 2011.  
Presentations: APS 2011

**d. Civic Activities**

|  |              |
|--|--------------|
| Westminster Schools speaker, host: Chanley Small | Apr 17, 2012 |
| Wheeler High School speaker, host: Dawn Adams    | Jan 2008     |
| Georgia Tech ASME speaker, host: Jinwoo Lee      | Feb 2010     |



**VI. GRANTS AND CONTRACTS**

**A. As Principal and Co-Principal Investigator**

| <b>Funded Proposals</b>  |  |                                    |                       |
|--|--|------------------------------------|-----------------------|
| <u>Title</u>   | <u>Funding Organization</u>  | <u>Level of Funding</u>            | <u>Dates</u>          |
| Mathematical Sciences Postdoctoral Research Fellowship   | National Science Foundation, Mathematical Sciences Division                        | \$108,000                          | Oct 2005 - Oct 2008   |
| 0920402 Rheology of Ants: structural properties of cooperative networks  | National Science Foundation Biological Sciences Directorate                        | \$212,000                          | Sept 2009 - Sept 2011 |
| 0848894 Complex Surface structure and locomotion   | National Science Foundation Physics Directorate                                    | \$390,000                          | Sept 2009 - Sept 2012 |
| Novel mechanism for drag reduction using a hairy surface   | Coulter Foundation; Georgia Tech-Emory-Peking University Seed Grant                | \$50,000                           | June 2011 – June 2012 |
| Wind assessment and tree-inspired energy generators for urban energy harvesting  | Georgia Tech Department of Housing   | \$50,000                           | Nov 2010 – Nov 2013   |
| Student Research Network in the Physics of Living Systems: Georgia Tech Node (Co-PI Hu with PI Goldman and a total of 6 Co-PI's) | National Science Foundation Physics Directorate                                    | \$1,118,000 (my share: \$200,000)  | Jan 2012 – Jan 2016   |
| The mechanics of sidewinding locomotion  | Elizabeth Smithgall Watts endowment; facilitated by Terry Snell in Dept of Biology | \$15,000                           | June 2011- June 2012  |
|  |  |                                    |                       |
|  |  | <b>TOTAL</b><br><b>\$1,025,000</b> |                       |

**Industry donations:** \$1000 from Autodesk in 2010

**B. Pending Proposals as Principal Investigator or Co-PI**

CAREER: Novel mechanism for flying insects to repel water. Under review at NSF Physics of Living Systems.

**VII. HONORS AND AWARDS**

Best Designed Poster (of over 100 posters), with Hamidreza Marvi for GTRIC (Georgia Tech Research Innovation Conference), Feb 2012

Best Paper Award Finalist (top 5 papers of conference), with Hamidreza Marvi for ASME DSSC October 2011.

Most Viewed Video of the Week, National Public Radio Science Friday, 2010, 2011

Two-time winner of Gallery of Fluid Motion Award, American Physical Society, Division of Fluid Dynamics, 2004, 2005

MIT Student Mural Competition, winner with J. Aristoff, B. Chan, J Bush. "Aquabatics" 2005

NSF Mathematical sciences Postdoctoral Fellowship, \$108K, 2005

NSF Graduate Research Fellowship. \$121 K, 2002

Presidential Graduate Fellowship, MIT. \$30 K, 2001

Ascher H. Shapiro Graduate Fellowship, MIT. \$15 K, 2000.

Tau Beta Pi, Engineering Honor Society, 2000.

Burchard Scholarship, MIT Department of Humanities and Social Science, 1997.

Westinghouse Science Talent Search, Semifinalist, 1997

## SUMMARY OF INSTRUCTION OPINION SURVEY

### Undergraduate Courses

| <b>Semester taught</b> | <b>Course name</b>                     | <b>No.<br/>enrolled</b> | <b>No.<br/>responded</b> | <b>Median<br/>score</b> |
|------------------------|--|-------------------------|--------------------------|-------------------------|
| Fall 2008              | Undergraduate fluids ME-3340           | 89                      | 63                       | 4.6                     |
| Fall 2009              | Undergraduate fluids ME-3340           | 94                      | 74                       | 4.1                     |
| Spring 2010            | Research Project Lab BIO-4690          | 18                      | 18                       | 4.9                     |
| Fall 2010              | Thermal-Fluids Engineering ME 3720     | 66                      | 47                       | 3.7                     |
| Fall 2011              | Graduate fluid mechanics ME-6610       | 28                      | 27                       | 4.3                     |
| Spring 2012            | Biomechanics of Insect Flight BIO-4690 | 6                       | 6                        | 5.0                     |
|                        |  |                         | Lifetime<br>average:     | <b>4.4</b>              |

#### Student comments

2009:I really enjoyed the course. I liked that your personality was incorporated into the structure and flow of the class. Made it more exciting. I liked that we started off with jokes. Because of this class I really want to understand Fluid Mechanics further in my Graduate years.

He is an inspiring professor. He genuinely cares about whether students are really learning the class materials and made some appropriate changes in schedules and class tactics along with the course - he is pretty considerate of what students say. I recommend you take him!

You have a very different teaching style than any other class I have been in. I like it. I learned a lot about problem solving in general.

Hu was an effective teacher with a desire to not only better us as students but also as people. His insight on grad school/life has definitely changed me and really pushed me in the direction to pursue grad school

2010:This class was very informative and at the same time fun. Professor Hu's approach to teaching certainly made this class easier to digest the material.

Dr. David Hu is a great professor. Attending his lectures has been a pleasure. The most enjoyable part was the final research project.... I think Georgia Tech should hire and retain more people like him in the future.

2011:Dr. Hu was simply a great teacher. I really admire him as a teacher and for his communication skills. His effective and confident delivery, wide gamut of knowledge and most importantly his ability to CREATE LIFE IN CLASS just makes him stand out of the lot.

This is one of the only classes that I look forward to attend. I was apprehensive because of mathematical rigor, but I could pick up the pace of the class.

One of the most interesting classes I have taken.

Overall a good course taught enthusiastically by a friendly and understanding professor.

The idea of a class picture and a letter is fantastic. One day when I become a faculty, I'll do the same and tell my class about you!

I love your style of teaching. Its well organized, full of examples and you know how to have fun.

2012: Dr. Hu is an excellent professor with a special gift for articulating all the necessary components of

*Dr. David Hu*  
7/17/2012

a project that must be completed for it to be successful. I especially enjoyed listening to the perspectives he shared with regard to the rigors of having work accepted by peer reviewed publications. Dr. Hu's dedication to his work and his students is simply unparalleled.

This has been my favorite lab class at Tech. I liked how you would give us suggestions but never ordered us to do anything. This was the best part of lab and where I really grew in regards to doing research.

This class was such a joy because we were able to bring in applications and concepts from other fields. Having hands on experience in seeing biology tied into other scientific fields was awesome.