

CURRICULUM VITAE

HAYLEY H. SHEN

PRESENT POSITION

Professor
Department of Civil and Environmental Engineering
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EDUCATION

Ph.D. 1982 Engineering Sciences, Clarkson University
Ph.D. 1976 Applied Mathematical Sciences, University of Iowa
M.S. 1974 Engineering Mechanics, University of Iowa
B.S. 1972 Mathematics, National Taiwan University

EMPLOYMENT

7/03-07,7/08-11 Associate Director, Honors Program, Clarkson University
7/92 – present Professor, Department of Civil and Environmental
Engineering, Clarkson University
7/86 – 6/92 Associate Professor, *ibid*
8/82 – 6/86 Assistant Professor, *ibid*
1/80 – 7/82 Adjunct Assistant Professor, Department of Civil and
Environmental Engineering, Clarkson University
8/76 – 12/79 Adjunct Assistant Professor, Department of Mathematics
and Computer Science, Clarkson University

Sabbatical and other visiting positions held:

1/12 – present Visiting Professor, Nanyang Technological University, Singapore
11/03-12/03 Long term visitor, Granular and Particle-Laden Flows, Isaac Newton
Institute for Mathematical Sciences, Cambridge, England
1/99 – 3/99 STA Fellow, University of Hokkaido, Japan
4/99 – 7/99 Visiting Professor, Tohoku-Gakuin University, Japan
9/98 – 12/98 Visiting Scientist, Frontier Research Systems for Global
Change, Japan
9-12/94 Visiting Professor, Otago University, New Zealand
5-7/05 Summer Faculty, NASA/Kennedy Space Center
7-9/91, 5-7/90 Summer Faculty, NASA/Marshall Space Flight Center
8/90 – 7/91 Visiting Professor, Luleå University of Technology,
Sweden
9/83 – 8/84 Research Physical Scientist, Army Cold Regions Research
and Engineering Laboratory

PROFESSIONAL MEMBERSHIP

American Academy of Mechanics
American Geophysical Union
American Institute of Aeronautics and Astronautics
The American Society of Civil Engineers
Fine Particle Society
International Glaciological Society
Mathematical Association of America
Sigma Xi

HONORS AND AWARDS

Fellow, Engineering Mechanics Institute, ASCE, 2013
Kirstin Craig Memorial Faculty Award, 2004
Outstanding Advisors, Clarkson University Phalanx Award, 2001
Million Dollar Club of Clarkson University Research Accomplishment, 2001
Japan Science and Technology Agency Fellow, Hokkaido University, 1999
Albert D. Merrill Faculty Prize, Clarkson University, 1995
William Evans Fellow, Otago University, New Zealand, 1994
Walter L. Huber Civil Engineering Research Prize, ASCE, 1991
ASCE/Engineering Foundation Research Institute Award, 1984

RESEARCH INTERESTS

Keywords of research interests: Granular media, constitutive relations, transitional flows, internal structures, ice formation in a wave field, water wave propagation in ice fields.

Granular Materials – Constitutive relations for a dry particulate material, including the effect of particle spin, particle shape, as well as the distribution of particle size. Transition of quasi-static to rapidly sheared flows. Effects of electrostatic and other long range forces on granular assemblies. Interaction of machine boundaries with granular materials. Computational simulation of granular assemblies and polymer flows.

Sea Ice Dynamics – Constitutive relations of marginal ice zones. Wave attenuation due to ice floe interactions in a wave field. Ice drift and collision rate in wave fields. Formation of pancake ice, limiting size and thickness of pancake ice covers. Ice productions rate in a wave field. Full rheological properties and dispersion relation of a general ice cover. Remote sensing analysis of ice motion. Laboratory experiments of ice formation and evolution using cold room facilities. Field experience in the Arctic (Greenland Sea) and the Antarctic (McMurdo/Scott Base).

Cross-disciplinary collaboration experience with biologists, geologist, glaciologist, oceanographer, physicists.

EDUCATIONAL INTERESTS

Associate Director of the Honors Program – Overlook the thesis process, match and monitor 60 thesis students (juniors and seniors) with mentors, provide research training/monitoring/advising, and processing the review of theses; support academic advising and national competitions. Integrated research into curriculum from the pre-freshman to senior years.

P.I. of NSF S-STEM program – Mentoring, and enrichment workshops, summer courses, and summer research opportunities for 60 under-represented students in STEM fields. High retention (89%) high average GPA (2.95), and high summer research participation (over 20%).

Outreach Education –Coached Horizon Program. Mentored high school students on research projects (one student earned Westinghouse Talent Search semi-finalist with her summer project on sea ice). Has ten years of REU site experience in China with a total of 132 participants from 41 US states. Helped establishing collaboration between US students and Chinese professors in sea ice and other environmental studies.

PROFESSIONAL ACTIVITIES

Committee Positions

Governor, Eng. Mechanics Institute, 2011-13
Chair, Advisory Board, ASCE Eng. Mechanics Division, 2002-03
Chair, Executive Committee, ASCE Eng. Mechanics Division, 1999-00
Chair, Fluids Committee, ASCE Eng. Mechanics Division, 1998-00 (member 1992-96, 98-2009)
Chair, Granular Flow, ASCE Eng. Mechanics Division, 1986-89 (member 1989-97)
News Correspondent, ASCE Eng. Mechanics Division, 1989-93

Member, Multiphase Flow Committee, ASME, 1988-2000
Member, Snow, Ice and Permafrost Committee, AGU, 1994-96
Member, Working Group of Wave-Ice Interaction for IAPSO, 1992-2000
Member, International Association of Hydraulic Research Ice Committee, 2006-present

Advising/Consulting

Consultant, New Zealand Foundation for Science and Technology, Dec. 1994.
Consultant, Swedish Mineral Industry Research Organization, Sept. 1990 – 1993.

Short Courses

Physics of Granular Flows, Soft Matter Physics Workshop, Chinese Academy of Sciences, Aug. 15-17, 2005.
Sea Ice Processes at the Ice Edge, Summer School of Earth System Sciences, Aug. 1-20, 2005.

Journal/Proposal Review

AGU/Water Resources Research
ASCE/Journal of Engineering Mechanics
ASCE/Journal of Environmental Engineering
ASCE/Waterway, Port, Coastal and Ocean Engineering
ASME/Offshore Mechanics and Arctic Engr. Division
ASME/Journal of Applied Mechanics
ASME/Journal of Fluid Engineering
ACTA MECHANICA
AIChE
CEWorld
Cold Regions Science and Technology
Department of Energy
International Journal of Multiphase Flow
International Journal of Particulate Science and Technology
JGR/Oceans
Journal of Glaciology
Journal of Hydraulic Research
Journal of Offshore Mechanics and Arctic Engineering
Natural Environment Research Council/United Kingdom
National Science Foundation
National Aeronautics and Space Administration
New Zealand Public Goodness Fund
The Royal Society of New Zealand Marsden Fund
The Isreal Science Foundation
The Petroleum Research Fund
Powder Technology, An International Journal

UNIVERSITY SERVICE

Committees

Faculty Senate, 1999-2008
Presidential Search Committee, 1994, 2002
Search Committee member, Dean for the School of Engineering, 2001
Search Committee member, Associate Dean for Health Science and Chair of the Department of Physical Therapy, 1996, 2002
CEE Chair of the Undergraduate Committee, 1995-98 (member 1997-present)
University Honors Council, member, 1996-98
Faculty Advisor, Tau-Beta-Pi, Clarkson University, 2001-present
Faculty Advisor, Chi-Epsilon, Clarkson University, 1998-00
Clarkson University Ad-hoc Committee on Research Focus Areas, 1995-97

Clarkson University Curriculum Renovation Committee, 1995-96
 Clarkson University Technology in Support of Teaching Committee, 1994-95
 CEE Teaching Improvement Committee, Member, 1993-94
 Clarkson University Strategic Planning Steering Committee, 1992-94
 CEE Chair of the Graduate Committee, 1987-89 (member 1990-91)
 Horizon Program Instructor (for 7th and 8th graders of high science aptitude) 1989
 Odyssey of the Mind Coach (science competition for 7th and 8th graders) 1988-89
Recruiting and Fund Raise
 Open House Speaker and Student Interviewer, 1997-present
 Lancy Foundation, 2002

GRADUATE STUDENTS ADVISED

Orlando, Andres "Particle Size and Boundary Effects in Rapid Granular Shear Flows: An Experimental and Numerical Study" Ph.D. 2011.
 Wang, Ruixue "Water Wave Propagation in Ice-Covered Oceans", Ph.D. 2010.
 Carr, Ose "A Laboratory Study of Pancake Ice Process in a Wave Field", M.S. 2006.
 Knuth, Margaret A. "Drift and Growth of Pancake Ice – A Numerical Study", M.S. 2006.
 Dai, M. "Pancake Ice Formation in the Ocean", Ph. D. 2004.
 Yuan, Y. "Laboratory Study of Pancake Ice Growth", M.S. 2003.
 Leonard, G.H., "A Study of Sea Ice Kinematics and Dynamics Through the Use of Remotely Sensed Products", Ph.D., 2001.
 Leonard, G.H., "Evaluation of Sea Ice Motion in the Western Ross Sea", M.S., 1998.
 Li, X., "Computational Simulation of Turbulent Single Phase and Multiphase Flows," Ph.D., 1996.
 Frankenstein, S., "The Effects of Waves on Pancake Ice," Ph.D., 1996.
 Babic, M., "Granular Flow with Contact Stress," Ph.D., 1990.
 Hwang, G.J., "Flows of Fluid-Solid Mixture," Ph.D., 1989.
 Shanani, S.S., (w/C. Raez) "Underwater Signal Processing in the Arctic Sea," Ph.D, 1989.
 Tsai, S.M., (w/HT Shen) "Dynamic Transport of River Ice," Ph.D., 1989.
 Hopkins, M.A., "Constitutive Relations for Rapidly Sheared Granular Flows: A Monte Carlo Form Based on the Kinetic Theory of Dense Gases," Ph.D., 1987.
 Pasquarell, G., (w/NL Ackermann) "Mathematical Modelling of Two-Dimensional Granular Flows," Ph.D., 1987.
 Shao, Z. "Application of Soil Plasticity Theory to Rive Ice Jams," M.S., 1990.
 Babic, M., "A Mean Free Path Theory for the Rapid Granular Flow of Disks and Spheres," M.S., 1985.
 Hopkins, M.A., "Collisional Stresses in a Rapidly Deforming Granular Flow," M.S., 1985.
 Raymond, R.K., "A Model for the Rapid Flow of Spherical Granular Material," Ph.D., 1985.

Post-Doctors and Visiting Scholars

Yan, Ying, Dalian University of Technology, China, 8/12-4/14.
 Sun, Shanshan, Dalian University of Technology, China, 10/10-9/12.
 Gao, Zhengguo, Beihang University, China, 12/07-12/08.
 Ji Shunying, Dalian University of Technology, China, 8/03-5/06, 10/11-11/11, 8/12-4/14.
 Toyota, Takenobu, Hokkaido University, Japan, 9/99.
 Luo, Lin, Sichuan Union University, People's Republic of China, 1/97-8/98
 Squire, Vernon.A., Otago University, New Zealand, 9/95-12/95
 Mansson, Anders, Lulea University of Technology, Sweden, 9-11/94
 Aidanpaa, Jan-Olov, Lulea University of Technology, Sweden, 9/91-8/93

COURSES TAUGHT

Graduate

Discrete Element Method, Coastal Engineering, Advanced Fluid Mechanics, Groundwater and Seepage, Sediment Transport, River and Estuarine Hydraulics, Hydrodynamic Dispersion, Continuum Mechanics, Nonlinear Mechanics

Undergraduate

Statics, Dynamics, Engineering for Non-Engineers, Introduction to Fluid Mechanics, Introduction to Engineering Use of Computers, Calculus II, Elementary Differential Equation, Fourier Series and Boundary Value Problems, Chaos and Coherency (Honors Science Course)

GRANTS RECEIVED

- “An Integrative Wave model in the Marginal Ice Zone based on a Rheological Parameterization”, Office of Naval Research, \$657,000, 10/12-10/17.
- “Validation of the DEM application for pancake ice using Star-CCM+”, American Bureau of Shipping, \$15,000, 1/11-3/11.
- “International Research Experience for Student – Advanced Materials for a Sustainable Development”, \$90,750, NSF, \$85,000, Corning/CAMP, 3/11-2/14.
- “Active Multi-Disciplinary Learning in Science, Technology, Engineering, and Mathematics Fields”, NSF, \$460,000, 4/07-3/12.
- “Preliminary Study of Ice Production Rate in a Wave Field”, NSF, \$37,365, 1/07-4/08.
- “Combining Discrete Element Modeling, Finite Element Analysis, and Experimental Calibrations for Modeling of Granular Material Systems”, Jenike & Johanson, Inc., \$30,013, 2/07-1/08.
- “Cryogenic Insulation Simulation and Experiment”, NASA-KSFC, \$25,000, 12/05-11/06.
- “Application of Discrete Element Modeling to simulation of soil-tool interactions”, Deere and Company, \$30,000, 7/04-1/05.
- “Shape descriptors for applying DE simulations to real aggregates”, Deere and Company, \$42,000, 9/05-3/06.
- “Constitutive Relations in Transitional Granular Flows”, NASA, \$430,000, 1/02-12/05.
- “Pancake Ice Cover Formation”, NSF, \$509,094, 9/99-7/04.
- “REU Site- Marine Science and Engineering in China”, NSF, \$880,091, 5/03-5/09 (w/H.T. Shen).
- “Travel Supplement to Pancake Ice Formation”, NSF, \$20,120, 9/01-12/01.
- “REU Supplement to Pancake Ice Formation”, NSF, \$20,000, 5/00-4/02.
- “REU Site- Marine Science and Engineering in China”, NSF, \$560,000, 5/00-4/03 (w/H.T. Shen).
- “IUTAM Symposium”, USNA, \$15,000, 1/00-12/00 (w/J.P. Dempsey)
- “IUTAM Symposium”, NSF, \$10,000, 10/98-4/99 (w/J.P. Dempsey).
- “IUTAM Symposium”, UAKA, \$17,000, 9/99-4/00 (w/J.P. Dempsey).
- “IUTAM Symposium”, USAR, \$10,000, 9/99-12/00 (w/J.P. Dempsey).
- “Pancake Ice Cover Formation”, NSF, \$456,025, 8/99-8/03 (w/S.F. Ackley and M.A. Hopkins).
- “Research Planning Visit to Bohai Sea”, NSF, \$8,596, 5/99-5/00 (w/H.T. Shen).
- “Remote Sensing of Sea Ice Cover”, NSF, \$9,750, 12/98-12/99.
- “Ice Motion over the Okhotsk Sea”, Exxon, \$76,895, 9/98-5/99 (w/H.T. Shen).
- “Feasibility Study of Remote Sensing of Sea Ice Motion over the Okhotsk Sea”, Exxon, \$6,400, 8/98 (w/H.T. Shen).
- “Remote Sensing of Ice Dynamics over the Great Lakes”, GLRC, \$3,000, 10/97-10/98.
- “Parametric Study of a Vane Diffuser”, USNA, \$25,000, 9/97-4/98.
- “Flowfield Analysis for Shipboard Compressors”, USNA, \$25,000, 1/97-12/97.
- “Ice Dynamics over the Great Lakes”, GLRC, \$4,650, 1/97-9/97.
- “Shipboard Compressor Design Modeling”, USNA, \$25,000, 10/96-10/97.
- “Computational Fluid Dynamics Modeling for Shipboard Compressors”, USNA, \$25,000, 9/96-9/97.
- “Anisotropic Turbulence in a Diffuser”, USNA, \$24,650, 8/95-9/96.
- “Diffuser System Evaluation”, USNA, \$23,715, 7/95-6/96.

- “Pancake Ice – REU”, NSF, \$40,200, 6/94-12/98.
- “Pancake Ice Drift in a Wave Field”, NSF, \$273,282, 3/93-12/98.
- “Flume for Multiphase Flows”, NSF, \$73,063, 7/92-12/93.
- “Wave-Ice Interaction”, USAR, \$10,000, 1/92-12/92.
- “Micromechanical Study of Fluid-Solid Flows”, NSF, \$50,000, 8/91-8/92.
- “US-Japan Seminar on Micromechanics of Granular Materials”, NSF, \$12,650, 4/91-4/92.
- “Wave Induced Ice Collisions”, \$10,000, USACRREL, 6/88-6/89.
- “Transport of River Ice”, USAR, \$160,670, 1/87-12/90 (w/H.T. Shen).
- “REU Supplement to Experimental Investigations of Two Dimensional Constitutive Relationships for Granular Materials”, NSF, \$7,900, 6/87-5/88 (w/N.L. Ackermann).
- “Experimental Investigations of Two Dimensional Constitutive Relationships for Granular Materials”, NSF, \$74,105, 12/85-5/88 (w/N.L. Ackermann).
- “Modeling of Moving Broken Ice Covers in Rivers, Lakes and Oceans”, \$29,436, USAR, 2/85-10/86.
- “The Stress-Strain Rate Relationships in a Fluid-Solid Mixture with Solids of Two Sizes”, Engineering Foundation, \$17,000, 1/84-1/85.
- “Rapid Shear Flow of Densely Packed Granular Solids”, NSF, \$49,593, 3/82-2/85 (w/N.L. Ackermann).
- “Constitutive Relations of Granular Flows with Multiple Sizes”, Engineering Foundation, \$17,000, 7/83-6/84.

PUBLICATIONS: See link at Publications on the Home Page.