Steve Kuei

Ph.D Candidate, Chemical and Biomolecular Engineering, Rice University

about

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languages

english
mandarin chinese

programming

MATLAB
Mathematica
FORTRAN
Java
C++
LaTeX

instruments

AFM
confocal microscopy
TIRF microscopy

interests

colloidal physics, single fiber dynamics and topology, fluid mechanics, Brownian dynamics and hydrodynamics simulations

education

2013-present **Ph.D** candidate in Chemical and Biomolecular Engineering — Rice University
GPA: 3.7
Selected coursework: Colloidal and Interfacial Phenomena, Biophysics, DNA Biotechnology and Modeling, Computational Fluid Dynamics, Rheology

2008–2012 **BSE** in Chemical Engineering — Princeton University
Certificates: Engineering Physics, Materials Science
GPA: 3.3
Selected Coursework: ODEs, PDEs, Organic Chemistry, Physical Chemistry, Polymers, Quantum Mechanics, Quantum Theory, Lagrangian Mechanics, General Relativity, Biophysics

2004-2008 — East Brunswick High School

summer 2007 — New Jersey Governor's School in Sciences
Studied neurobiology, organic chemistry, geometric constructions, and celestial mechanics

research

2013-present **Soft Matter Laboratory** — Biswal Group, Rice University
Magnetic fields are used to assemble linked colloidal chains, which are driven by rotating or oscillating external fields and flows. Chain dynamics are imaged and analyzed via confocal and light microscopy; observations and theory are augmented with Brownian Dynamics simulations.

2011-2013 **Complex Fluids Laboratory** — Stone Group, Princeton University
Implemented HYDROMULTIPOLE algorithm to simulate single fiber dynamics in various simple flows. Resulting configurations were analyzed with particular emphasis on fiber orientation, shape, and topology.

06-12 2011 **Molecular and Cellular Biomechanics Laboratory** — Valentine Group, UCSB
Mentor: Dezhi Yu. Used fluorescence microscopy (TIRF) to image microtubules under the influence of various MAPs and small molecules, such as tau and taxol. Helped develop an improved spectral decomposition algorithm to determine the fibers' mechanical properties.

2010-2011 **Organic and Polymer Electronics Laboratory** — Loo Group, Princeton University
Deposited semi-conducting organic polymers, such as P3HT, using several methods (spin coating, dip coating, etc.) on substrates with non-zero gaussian curvature of various patterns. Used AFM to image and analyze the crystallized polymer and determine its mean orientation.

publications

Kuei, Steve, Agnieska Słowicka, Maria Ekiel-Jeżewska, Eligiusz Wajnryb, Howard Stone. Dynamics and Topology of Flexible Chains in Steady Shear Flows. *New J. of Physics*, **17** (2015), 053009. doi:10.1088/1367-2630/17/5/053009.
Highlighted in IOPselect, a special collection of journal articles chosen by the Editors for substantial advances, a high degree of novelty, and significant impact on future research.

Yu, Dezhi, Veronica Pessino, Steve Kuei, and Megan T. Valentine. Mechanical and Functional Properties of Epothilone-Stabilized Microtubules. *Cytoskeleton*, **70** (2013), pp. 74-84. doi:10.1002/cm.21091

Valdman, David, Paul J. Atzberger, Dezhi Yu, Steve Kuei, and Megan T. Valentine. Spectral Analysis Methods for the Robust Measurement of the Flexural Rigidity of Biopolymers. *Biophysical Journal*, **102** (2012), pp. 1144-1153. doi:10.1016/j.bpj.2012.01.045

presentations

"Dynamics and Conformations of Semiflexible Particle Chains Driven By Rotating Magnetic Fields"
Steve Kuei, Sibani Lisa Biswal
American Institute of Chemical Engineers Annual Meeting. Salt Lake City, UT, Nov. 2015.

"Conformations of semiflexible magnetic chains under rotating magnetic fields"
Steve Kuei, Sibani Lisa Biswal
ACS 89th Colloid & Surface Science Symposium. Pittsburgh, PA, June 2015.

"Using simple flows to tie knots in flexible fibers"
Steve Kuei, Chris Sadlej, Howard Stone
APS 65th Annual Division of Fluids Dynamics Meeting. San Diego, CA, November 2012.

"Spectral analysis methods for flexural rigidity measurements"
Steve Kuei, Dezhi Yu, Megan Valentine
RISE Summer Research Colloqium. Santa Barbara, CA, August 2011.

"Polymer crystallization on curved surfaces"
Steve Kuei, Lynn Loo
PEI Summer of Learning Symposium. Princeton, NJ, Sept 2010.

awards

2015 **Riki Kobayashi Fellowship Award** Rice University
Presented for outstanding Ph.D Thesis Proposal entitled: "Dynamics of magnetically actuated colloidal particle chains". Awarded to one thesis proposal in the department per year, by the ChBE Graduate Studies Committee.

2015 **Chemical Engineering Dept. Teaching Assistant Award** Rice University
Awarded to two Teaching Assistants every year, for dedication, patience, and knowledge of course material, as chosen by the Junior Class in Fall 2015 (CHBE 401).

2014 **Chemical Engineering Dept. Teaching Assistant Award** Rice University
Awarded to two Teaching Assistants every year, for dedication, patience, and knowledge of course material, as chosen by the Junior Class in Fall 2014 (CHBE 401).

2013 **Chemical Engineering Dept. Teaching Assistant Award** Rice University
Awarded to two Teaching Assistants every year, for dedication, patience, and knowledge of course material, as chosen by the Senior Class in Fall 2013 (CHBE 443).

2011 **Research Internships in Science and Engineering** UC Santa Barbara
Accepted into undergraduate summer research program with the Materials Research Laboratory at UCSB; advised by Professor Megan Valentine.

2010 **Siebel Energy Grand Challenge Award** Princeton Environmental Institute
Grant awarded to pursue student-initiated summer research, in the Organic and Polymer Electronics Laboratory; advised by Professor Lynn Loo.

teaching experience

2015 **Dean's Teaching Assistant** Rice University
CHBE 401: Transport Phenomena I - see TA duties below. In addition, in charge of designing curriculum and teaching during main lectures.

2013-present **Teaching Assistant** Rice University
CHBE 443: Chemical Engineering Lab II - introduced, supervised, and graded spectroscopy, distillation, heat transfer, and process control labs
CHBE 305: Comp. Methods in Chem. Eng - graded problem sets and exams.
CHBE 401: Transport Phenomena I - in charge of preparing problems and lecturing during recitations each week, as well as leading problem sessions each week and exam review sessions.

2008-present **Private tutoring** East Brunswick, NJ; Princeton, NJ; Houston, TX
Instructed over a dozen students in the areas of algebra/calculus, biology, and chemistry, helping strengthen fundamentals, derivations, and concepts, to help in school and on SATs

2008-2012 **Princeton Juggling** Princeton, NJ
Taught diabolo weekly in public sessions.

2005-2009 **Mid-Jersey Chinese School** East Brunswick, NJ
Taught weekly diabolo classes to 30 students aged 7-18, and also prepared them for performances and state-wide competitions.

leadership and activities

2015-present **Center for Teaching Excellence Graduate Advisory Board** Graduate Liason, ChBE
Department representative to the Center for Teaching Excellence Advisory Board, which seeks to further teaching excellence at Rice University, by providing workshops and opportunities to train in various classrooms skills, such as oration, curriculum design, etc.

2015-present **School Advancement Committee** Graduate Committee member
Department representative for the School Advancement Committee, which is a high-level review of the George R. Brown School of Engineering, to discuss student challenges and current opportunities, as well as new initiatives for the future direction of the school.

2013-present **Funkonomics Crew** Artistic Director (2015-present)
Performing member, in bboy and hip-hop styles; in charge of coordinating, choreographing, and preparing guest performances with various groups around campus; choreographed and taught eight pieces for performances. In charge of teaching twice-weekly hip-hop classes, for which multiple pieces were choreographed or learned elsewhere.

2014-present **ChBE Graduate Student Association** Publicity Chair, Vice President
Planned and helped run academic and social events for the ChBE graduate students, such as barbeques, seminars, and receptions; in charge of all marketing and publicity, such as designing posters, t-shirts, and managing social media (publicity chair, 2014-2015). In charge of and co-organizer of the ChBE Graduate Mentor program, a new initiative wherein incoming students are paired with older mentors to help them acclimate to graduate life (Vice President, 2015-present).

2010-2013 **Triple 8 East Asian Dance Company**
Performing member in various dance styles: hip-hop, martial arts, Chinese traditional, and modern; choreographed and taught two full pieces and several short pieces and workshops.

2008-2012 **Princeton Juggling Club** Co-president
Organized guest performances and logistics for the 2010 annual show, managed club finances and equipment, and managed club website and communications (as co-president, 2009-2010); performed in group shows, and 20+ individual diabolo performances.

2009-2012 **Princeton Taiwanese American Student Association**
Coordinated cultural events, banquets, Asian Night Market (2012 Class Representative, 2010-2011); managed group website and social media (Webmaster, 2011-2012)

2010-2011 **Intercollegiate Taiwanese American Student Association** Marketing Director
helped plan and run 2011 East Coast ITASA conference with 400+ attendees; created promotional materials and conference materials for all attendees, and managed the event's website and social media outlets.

2008-2012 **Sympoh Urban Arts Dance Crew**
Performing member, in bboy and hip-hop styles; choreographed and taught sections for workshops and auditions; taught beginner workshop series for new members (2009-2012)