

Undergraduate Research Newsletter

Summer Edition (Issue 5), June 22, 2009

June 24, 12:00 pm
Lower Herrick



Janet Scheel, Assistant Professor of Physics

Go With the Flow: Numerical Simulations of Turbulence in Fluids

Lower Herrick, includes lunch!

Turbulent systems are all around us, from waves crashing on the beach, to smoke rising, from the cigarette you shouldn't be smoking, to making our airline flights bouncy and sometimes downright frightening. Turbulence is a very complicated system which is poorly understood. Physicists use more simplified systems, such as Rayleigh-Benard convection cells, to study some of the features of turbulence, including thermal plumes and large-scale circulation. In Rayleigh-Benard convection, a cylindrical fluid cell is bounded by horizontal parallel plates kept at a constant temperature difference. Janet Scheel will show results from numerical simulations of the equations which describe Rayleigh-Benard convection and compare to experimental and theoretical results.



Nicole Ing '12 took her first Physics class last year (Physics 106 Waves taught by Professor Schmiedeshoff) and she was hooked. Now she's spending her summer doing research on Rayleigh-Benard convection with Professor Janet Scheel (this Wednesday's speaker). "I thought her research was very interesting and that I could learn a lot of computer skills," Ing said after she heard about Professor Scheel's research at a Physics Department meeting. Rayleigh-Benard convection occurs in liquid between two plates with a fixed temperature difference. When "one plate is super hot and one plate is super cold, it enters a chaotic, turbulent state," explained Ing.

She is creating computer simulations to model the effects of different container geometries on the flow of the fluid between the plates. "It's really cool to learn all the math behind it," she said, although she finds the program she uses extremely frustrating. "It's from the 80's and there's no back button," she explained, "It took me 15 times to make one grid."

Recently, she visited UC Santa Barbara where they conduct real-life versions of this experiment but since it is impossible to look inside the containers without disturbing the flow, simulations are important. So far she is still waiting for results, although she has seen some differences with her different shapes. For example, using a square results in slower *slugs*, a term for when the fluid drips down.

Although the computer program is just a simulation, Ing has included a variable that shuts off the simulation when it determines that it has become inaccurate. It accumulates error with each step in the simulation and calculates this to decide when the error is too high to be accurate.

Ing hopes to specialize in Materials Science. "I'd like to help people," she said, mentioning that she's interested in Professor Hightower's work on fuel cells and trips to Africa to install solar panels.



MONDAY JUNE 29, 12 noon to 1 pm, YOUNG DINING ROOM, JOHNSON STUDENT UNION

Learn about Master's and Doctoral Programs in Public Health!

Join Cecilia Fox, Director, PreHealth Professions Advising— informal meeting with Vincent Atchity, PhD, Director, Student Services and Admissions at the UNIVERSITY OF CALIFORNIA, BERKELEY SCHOOL OF PUBLIC HEALTH. The State of California urgently needs trained public health professionals & UC Berkeley has been mandated to expand enrollment significantly over the next few years. Dr. Atchity notes that Occidental has sent them outstanding candidates recently, from diverse majors. As a result, his visit is part of their outreach and recruiting effort. HURRY TO RSVP to fox@oxy.edu. A modest lunch will be available for the first 25 who respond.

Weekend Ideas

More events at departments.oxy.edu/urc/about/calendar.htm

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| June 25, 2009
4:00-6:00 pm | Opening of LASERIUM
Interactive Laser light show
Hollywood and Vine (accessible by the red line)
www.laserium.com |
| June 26, 2009
10:00 am-6:00 pm | Pacific Asia Museum Free Day
46 N Los Robles Ave
Pasadena, CA 91101
http://www.pacificasiamuseum.org |
| June 26, 2009 | Rock Climbing
Contact ResLife for details |
| June 28, 2009 | Dirty Dancing at the Pantages Theater
Contact ResLife for details |



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