

## GFD Newsletter 2018

### Faculty of Walsh College



*The 2018 GFD Photograph.*

### *The Structure of the Summer*

*Sustainable Fluid Dynamics* was the theme at the 2018 GFD Program, and Professor Andrew Woods was the principal lecturer. Andy showed the audience in the cottage and on the porch how to find similarity solutions everywhere, from deep in the earth to high in the atmosphere. He expanded on his lectures with the fellows during “Andy time”, and stayed on throughout the summer to participate in the traditional debates on the porch with participants old and new, including a former congressman-fellow, who dropped by to say hello. Andy also contributed enthusiastically to the supervision of the fellows, particularly when there was an opportunity to squirt food dye into an experiment.

At the end of July, John Dabiri of Stanford University gave a brilliant and well-received Sears Lecture on “Biological Propulsion in (and of?) the Ocean”. The third Week 3 Awards Ceremony distributed, as is now traditional, a wide range of prizes, in particular to Shreyas Mandre as the GFD Distinguished Scholar for 2018.

Neil Balmforth and Colm-cille Caulfield co-directed the summer, and once the World Cup was over, did their

best to ensure the smooth running of the summer. A large number of long-term staff members ensured that the fellows never lacked for guidance, and the seminar series was filled by a steady stream of visitors, talking about topics as diverse as sneezes, squeezes and shear.

Anders Jensen worked his usual magic in the Lab, dealing inventively with lava, fountains and recalcitrant plumes with typical good humour, and Janet Fields and Julie Hildebrandt smoothly ran the program as always.



*Andy, thinking of another similarity solution*



*Andy time in the sunshine*



*GFD Dynamos, Rookies of 2018*

## Schedule of Principal Lectures

*June 18: Introduction and Buoyant Plumes*  
*June 19: Confined Plumes and Mixing*  
*June 20: Flow in Buildings*  
*June 21: Blowouts, Volcanic Plumes and Lake Eruptions*  
*June 22: Inertial Gravity Currents: Ash Flows and Turbidites*  
*June 25: Flow in Wells and Volcanic Conduits*  
*June 26: Porous Rocks: Formation, Structure and Dispersion; Hele Shaw Cells and Oil Recovery*  
*June 27: Viscous Fingering and Related Phenomena*  
*June 28: Porous Gravity Currents and CO2 Sequestration*  
*June 29: Geothermal Energy Recovery and Buoyancy Effects*

## Fellows' Reports

Laura Cope, University of Cambridge  
*Horizontal shear instabilities in the stellar interior*  
 Neeraja Bhamidipati, University of Cambridge  
*How mixed is the ocean mixed layer?*  
 Edward Hinton, University of Cambridge  
*Defending against viscous flows*  
 Sutirtha Sengupta, University of California, Santa Cruz  
*Centrifugally forced Rayleigh-Taylor instability: growth of varicose perturbations*  
 Rohit Supekar, Massachusetts Institute of Technology  
*Viscoplastic flow around a cylinder: nuggets or no nuggets?*  
 Tyler Lutz, Yale University  
*Spooky mixing at a distance: nonlocal eddy fluxes from stochastic advection*  
 Bowen Zhao, Yale University  
*Instability of piecewise, uniform, quasi-geostrophic vortex above topography*  
 Christopher Howland, University of Cambridge  
*Interacting plumes in a rotating environment: The special case of a single plume*  
 Andrea Lehn, Massachusetts Institute of Technology  
*Fountains, jets and rotation, oh my!*  
 Sara Lenzi, University of Turin  
*Swimming with posts*  
 Thomas Le Reun, Aix-Marseille Université  
*Porous convection with internal heating: driving Enceladus' hydrothermal activity*



*The fellows, & evidence they won at least one (inning)*



*Ed finds the fatal fork in David's argument*



*The 2018 distinguished scholar, with an admirer*



*Porch People: The Next Generation*



*Rush Holt (Fellow 1972, US Representative for NJ 12th District 1999-2015) back in the cottage*

**2018 Sears Public Lecture**  
Geophysical Fluid Dynamics Program

**Monday, July 30<sup>th</sup> 2:00 pm**  
**Redfield Auditorium, WHOI**  
*Reception to follow*

**Professor John O. Dabiri**  
Stanford University



**Biological Propulsion in  
(and of?) the Ocean**

The world's oceans are in constant motion, transporting the sun's heat from the equator to the poles, bringing marine life fresh supplies of oxygen and nutrients, and sequestering nearly half of our carbon dioxide emissions since the Industrial Revolution. Within this dynamic aquatic milieu exists another type of motion: the perpetual teeming of trillions of swimming animals. Are these organisms simply along for the ride, carried by the prevailing ocean currents and occasionally using their powers of locomotion to explore their surroundings, or could their propulsion influence the physical and biogeochemical structure of the ocean itself?

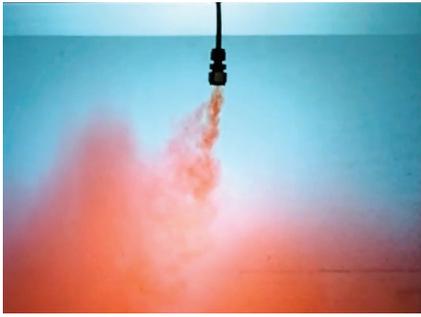


*John Dabiri gave a thought-provoking and well-attended Sears Lecture, presenting the fascinating hypothesis that bio-swimming may be a major contributor to ocean mixing*

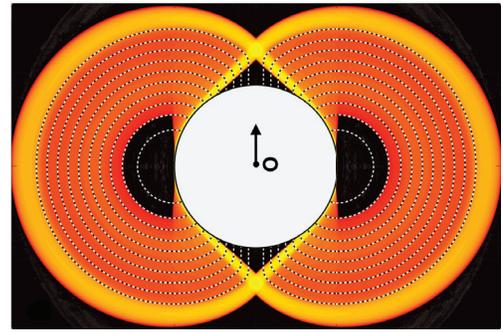
### *The GFD Faculty*

The GFD Faculty handles the scientific and administrative duties of the school. This group is made up of members of the scientific community, across several disciplines, united by their interest in GFD. These are the faces to be seen at GFD over future summers, and their research interests help to define the scientific direction and flavor of the Program.

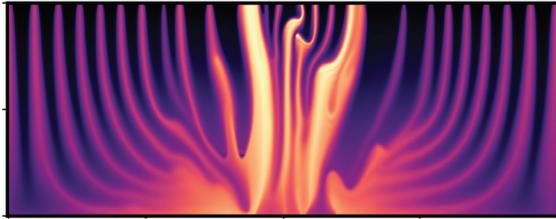
Neil Balmforth *University of British Columbia*  
 Oliver Buhler *New York University*  
 Colm-cille Caulfield *University of Cambridge*  
 Claudia Cenedese *W. H. O. I.*  
 Eric Chassignet *Florida State University*  
 Gregory Chini *University of New Hampshire*  
 Charles Doering *University of Michigan*  
 Glenn Flierl *M. I. T.*  
 Pascale Garaud *U.C. Santa Cruz*  
 Karl Helfrich *W. H. O. I.*  
 Miranda Holme-Cerfon *New York University*  
 Richard Kerswell *University of Cambridge*  
 Norman Lebovitz *University of Chicago*  
 Stefan Llewellyn Smith *U. C. San Diego*  
 Philip Morrison *University of Texas at Austin*  
 Joseph Pedlosky, *W.H.O.I.*  
 Antonello Provenzale *ISAC-CNR, Torino*  
 Tiffany Shaw *University of Chicago*  
 Edward Spiegel *Columbia University*  
 Bruce Sutherland *University of Alberta*  
 Jean-Luc Thiffeault *University of Wisconsin*  
 Mary-Louise Timmermans *Yale University*  
 George Veronis *Yale University*  
 John Wettlaufer *Yale University*  
 Jack Whitehead *W. H. O. I.*



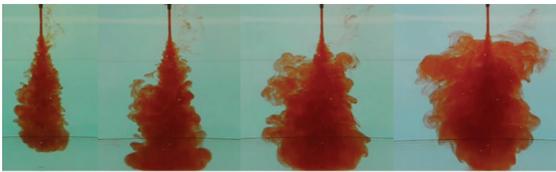
*“Plume” by Chris*



*Rohit’s nuggets*



*“Plume” by Thomas*

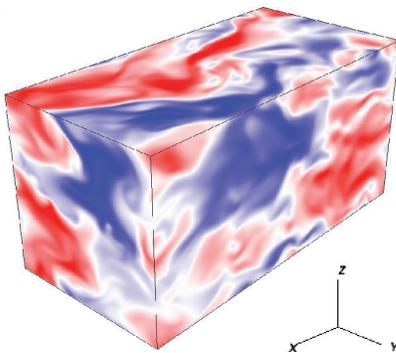


*“Let them rotate” by Andrea*

### *The GFD Website*

The lecture notes and reports will eventually be available online at [gfd.whoi.edu](http://gfd.whoi.edu). The GFD website also contains:

- lecture and seminar schedules
- electronic versions of proceedings and newsletters
- lists of alumni and visitors
- application materials
- picture galleries of life at GFD
- useful information and links.



*One of Laura’s shear simulations*

### *Contributions*

The GFD program has established an endowment fund to help support the program in the future and for a specially funded position intended to help finance the extended visit of a key participant, such as the summer’s Principal Lecturer. The fund is administered by WHOI. If you would like to contribute, please send your check (made payable to WHOI) to

Woods Hole Oceanographic Institution  
GFD Fund, MS 40  
Woods Hole, MA 02543

Donations can also be made by credit card by calling the Development office at 508-289-4895.

Please send comments on this newsletter to [njb@math.ubc.ca](mailto:njb@math.ubc.ca) or [cpc12@cam.ac.uk](mailto:cpc12@cam.ac.uk)  
The GFD Program is funded by the National Science Foundation.



*Synchronised directing*