MECHANICAL AND AEROSPACE ENGINEERING
HENRY SAMUELI SCHOOL OF ENGINEERING AND APPLIED SCIENCE, UCLA

MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENTAL SEMINARS
DISTINGUISHED SPEAKER SERIES
Joint MAE and Bioengineering Seminar

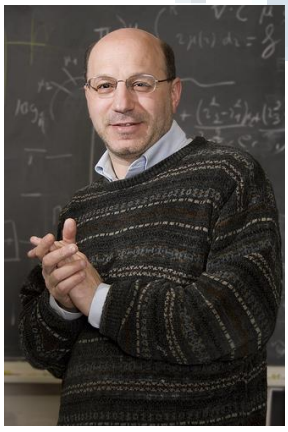
"New Observations of Particle Motions in Simple Geometries: Examples From Both Low and High Reynolds Numbers"

Prof. Howard Stone

Donald R. Dixon '69 and Elizabeth W. Dixon Professor
in Mechanical and Aerospace Engineering and Chair
Princeton University

Thursday, March 17, 2016
38-138 Eng. IV
Time: 4:00 pm – 5:00 pm

Abstract: The flow of particle-laden flows occurs widely, including bulk flows at low or high Reynolds numbers. We give a few examples of our current work in this area. First we consider flow in a T-junction, which is perhaps the most common element in many piping systems. The flows are laminar but have high Reynolds numbers, typically Re=100-1000. It seems obvious that any particles in the fluid that enter the T-junction will leave following the one of the two main flow channels. Nevertheless, we report experiments that document that bubbles and other low density objects can be trapped at the bifurcation. The trapping leads to the steady accumulation of bubbles that can form stable chain-like aggregates in the presence, for example, of surfactants, or give rise to a growth due to coalescence. Our three-dimensional numerical simulations rationalize the mechanism behind this surprising phenomenon. Second, we consider low Reynolds number flows in channels and porous systems with dead-end pores. We document how salt gradients, via a mechanism referred to as diffusiophoresis, can remove particles from dead-end pores or deliver particles into such pores. The transport can be size dependent and we explore the phenomenon using experiments and modeling.



Biosketch: Professor Howard A. Stone received the Bachelor of Science degree in Chemical Engineering from the University of California at Davis in 1982 and the PhD in Chemical Engineering from Caltech in 1988. Following a postdoctoral year in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge, in 1989 Howard joined the faculty of the (now) School of Engineering and Applied Sciences at Harvard University, where he eventually became the Vicky Joseph Professor of Engineering and Applied Mathematics. In 1994 he received both the Joseph R. Levenson Memorial Award and the Phi Beta Kappa teaching Prize, which are the only two teaching awards given to faculty in Harvard College. In 2000 he was named a Harvard College Professor for his contributions to undergraduate education. In July 2009 Howard moved to Princeton University where he is Donald R. Dixon '69 and Elizabeth W. Dixon Professor in Mechanical and Aerospace Engineering

Professor Stone's research interests are in fluid dynamics, especially as they arise in research and applications at the interface of engineering, chemistry, physics, and biology. In particular, he is well known for developing original research directions in microfluidics including studies and applications involving bubbles and droplets, red blood cells, bacteria, chemical kinetics, etc. He received the NSF Presidential Young Investigator Award, is a Fellow of the American Physical Society (APS), and is past Chair of the Division of Fluid Dynamics of the APS. For ten years he served as an Associate Editor for the Journal of Fluid Mechanics, and is currently on the editorial or advisory boards of New Journal of Physics, Physics of Fluids, Langmuir, Philosophical Transactions of the Royal Society, Soft Matter, and is co-editor the (new) Soft Matter Book Series. He is the first recipient of the G.K. Batchelor Prize in Fluid Dynamics, which was awarded in August 2008. He was elected to the National Academy of Engineering in 2009, the American Academy of Arts and Sciences in 2011 and the National Academy of Sciences in 2014.

For more information, please contact Prof. **Jeff Eldredge** at eldredge@seas.ucla.edu
All faculty, students, and guests are welcome to this event. (Refreshments will be served.)