

Mathematics, Statistics, and Computer Science Department Seminar

Macalester College

Tuesday September 18, 2012, 4:40-5:40 pm, Olin-Rice 250

An Introduction to Surface Tension (Or Why Raindrops are Spherical)

Andrew Bernoff

Harvey Mudd College

A common misconception is that raindrops take the form of teardrops. In fact, they tend to be nearly spherical due to surface tension forces. This is an example of how at small scales the tendency of molecules to adhere to each other is the dominate effect driving a fluid's motion. In this talk we will explain how surface tension arises from intermolecular forces. We will also examine some examples of the behavior that can occur at small scales due to the balance between fluid-fluid and fluid-solid forces, with applications as varied as understanding how detergents help clean clothes to designing fuel tanks in zero gravity environments.



Andrew Bernoff is a Professor of Mathematics at Harvey Mudd College. His research specializes in bridging the gaps between Mathematics, Physics, Biology and Engineering with a particular emphasis on using dynamical systems methods to understand experiments and natural phenomena. Prof. Bernoff was an undergraduate at MIT, where he received BS degrees in Mathematics and Physics. His PhD is from the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge in England. Prof. Bernoff has spent time on the faculty at Northwestern, Duke, and the UC- Berkeley before settling in at Harvey Mudd College, where he is the Diana and Kenneth Jonsson Professor of Mathematics and Chair of the Mathematics Department. His research centers on understanding the behavior of fluids at small scales and modeling the swarming of organisms, in particular locusts, and is built on collaborations at multiple colleges and universities. This fall he is on sabbatical at the Institute for Mathematics and its Application at the University of Minnesota.