Biographical sketch

Nadine Aubry

Dr. Nadine Aubry is Professor and Head of the Department of Mechanical Engineering at Carnegie Mellon University where she conducts research in the area of fluid dynamics. She pioneered the modeling of open flow turbulence and other complex flows using advanced decomposition tools and dynamical systems theory. Her current group's research focuses on microscale flows that she manipulates using electric fields. Particularly, her team has proposed new techniques for effective mixing, droplet generation, the manipulation of particles suspended in liquids and the assembly of micro- and nano-sized neutral particles at fluid-fluid interfaces into two-dimensional arrays (monolayers). Dr. Aubry's awards include the Presidential Young Investigator Award from the National Science Foundation (NSF), and her election as Fellow of the American Physical Society (APS), Fellow of the American Society of Mechanical Engineers (ASME), Fellow of the American Association for the Advancement of Science (AAAS), and Senior Member of the American Institute of Aeronautics and Astronautics (AIAA). She currently serves as Chair of the U.S. National Committee for Theoretical and Applied Mechanics (USNC/TAM).

Electric Field Induced Phenomena in Micro-flows:

Mixing, Particle Manipulation and Self-Assembly

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Although the further understanding of micro-fluid dynamics, that is the analysis and control of fluid dynamics at microscale, is crucial for further developing microfluidic devices such as laboratory-on-a-chip, it also presents a new set of fundamental challenges. Some of those come from the fact that small scale flows and their suspended particles can be controlled by applying electric fields. In this talk, we will present some of our work in small, confined geometries at the interface between fluid dynamics and electrostatics. Particular problems will include the enhanced mixing of a two-fluid layer, the manipulation of micro- and nano-particles suspended in a liquid and the self-assembly of neutral particles at fluid-fluid interfaces using capillary and electrostatic forces, the latter being induced by an externally applied electric field.