CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

Professor Victor Yakhot
Department of Mechanical Engineering,
Boston University
Boston, MA

Nanofluidics of Oscillating Bodies: Application to Nanoresonators

The dynamics of oscillating bodies are considered in the entire range of dimensionless frequency variation $0 \le Wi \equiv \omega\tau \le \infty$ where τ is the relaxation time of a close-to-equilibrium fluid. I will show the analytic solution to the Boltzmann-BGK equation and present a universal expression for the dissipation rate of kinetic energy valid in both Newtonian ($Wi \to 0$) and non-Newtonian ($Wi \to \infty$) regimes. The theoretical predictions have been tested against LBM numerical simulations and experiments of nanoresonators operating in a wide range ($10^6 Hz \le \omega 10^9 Hz$, frequency and pressure ($1.torr \le p \le 1000torr$) variation. The experimental results are insensitive to variation of a linear dimension of the resonator in the interval $10^{-6} m \le L \le 10^{-2} m$.

TUESDAY, SEPTEBER 16, 2008
3:00pm
Barus & Holley, Room 190