Special Joint Seminar

MMEC SEMINAR SERIES

MECHANICS: MODELING,
EXPERIMENTATION, COMPUTATION

and

PHYSICAL MATHEMATICS SEMINAR

BREAKING DROPS, COLLAPSING CAVITIES, AND DRIPPING CRYSTALS

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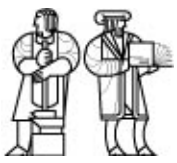
ABSTRACT:

When a drop falls from a faucet, the size of the fluid neck separating the drop from the nozzle goes to zero, producing very small length scales. The fluid motion close to breakup is self-similar and universal: it does not depend on initial conditions. This is easily confirmed experimentally, since convergence onto the similarity solution is exponential, thus non-universal behavior quickly falls away. In other examples of pinch-off, however, the linearization around the asymptotic solution (the fixed point) has zero eigenvalues, so convergence is slow. For the dripping of a ^{3}He crystal, the expansion around the fixed point has a quadratic non-linearity. In the case of a gas bubble breaking up in water, the non-linearity is of third order. For the latter case in particular, the asymptotic behavior is virtually unobservable; instead, the scaling *appears* to be characterized by anomalous scaling exponents, as reported in recent experiments.

TUESDAY, SEPTEMBER 11, 2007
4:30 PM
Building 3, Room 370

Light refreshments will be available a few minutes before the seminar, in the hallway just outside Room 3-370.



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