Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

**Sessile Rayleigh drop instability** PAUL STEEN, Cornell University, JOSH BOSTWICK, NC State University — Rayleigh (1879) determined the mode shapes and frequencies of the inviscid motion of a free drop held by surface tension. We study the inviscid motions of a sessile Rayleigh drop – a drop which rests on a planar solid and whose contact-line is free to move. Linear stability analysis gives the modes and frequencies of the droplet motions. In this talk, we focus on the "walking instability," an unstable mode wherein the drop moves across a planar substrate in an inviscid rocking-like motion. The mode shape is non-axisymmetric. Although the experimental literature has hinted at such a mode, this is the first prediction from linear stability analysis, as far as we are aware. The "walking instability" of the drop converts energy stored in the liquid shape into the energy of liquid motion – which represents a heretofore unknown pathway of energy conversion of potentially wide significance for a broad range of applications.

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Date submitted: 09 Aug 2012 Electronic form version 1.4