

Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

The Viscous Catenary: Experiments and Simple Theory CATALIN D. MITESCU, JOHN KOULAKIS, Dept. of Physics, Pomona College, Claremont CA, FRANÇOISE BROCHARD, PIERRE-GILLES DEGANNES, Institut Curie, Paris, ETIENNE GUYON, PMMH ESPCI, Paris — Detailed experimental observations have been carried out on the evolution of a viscous catenary, a filament of (100,000 centistokes kinematic viscosity) silicone oil stretched between two points, falling under the influence of a uniform gravitational field. Precise data describing this evolution have been obtained by digitizing high-resolution, multiple-exposure stroboscopic pictures. The shape of the filament is observed to depend on the quantity of fluid it contains: the thicker filaments assuming the catenary-like shape, while thinner ones evolve in a more surprising and complicated manner. In the first case, we have found that the evolution is well described by a simple theoretical model involving a variational calculation of the energy balance between the rate of viscous dissipation and the decrease in gravitational energy of the filament. For the thinner filaments, on which theoretical work is in progress, surface tension effects, complicating the analysis, appear to be responsible for the more complex structure.

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Date submitted: 04 Aug 2006

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