

MAR12-2011-003019

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Dynamic curling of a naturally curved Elastica¹

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We consider the motion of a naturally curved Elastica that has been flattened onto a hard surface. When it is released from one end, the Elastica lifts off the surface and curls dynamically into a moving spiral. The motion is governed by inertia, bending and geometric nonlinearity. At long times, the dynamics follows a self-similar regime: the size of the spiral grows like the cubic root of time, while the velocity of the front reaches a constant value. The asymptotic velocity is derived analytically, and compared to numerical simulations and to experiments.

¹Joint work with Andrew Callan-Jones and Pierre-Thomas Brun