Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Over-damped elastic 'snap-through' MICHAEL GOMEZ, DEREK E. MOULTON, DOMINIC VELLA, Mathematical Institute, University of Oxford — Elastic 'snap-through' occurs when a system is in an equilibrium state that either disappears or becomes unstable as a control parameter varies. The switch from one state to another is generally rapid and hence is used to generate fast motions in biology and engineering. While the conditions under which simple elastic objects undergo snap-through have been reasonably well studied, how fast snapping happens is much less well understood. Recently, it has been shown that snap-through can be subject to critical slowing down near the snapping transition, so that the dynamics may be slow even in the absence of viscous damping. Here, we study the interaction of snap-through with the flow of a viscous fluid. We begin by showing how snap-through may be used to create a channel whose hydraulic conductivity changes discontinuously in response to fluid flow. We then study the dynamics of snap-through for an elastic element embedded in a viscous fluid, which is typical of pull-in instabilities in micro-electromechanical systems (MEMS).

Michael Gomez
Mathematical Institute, University of Oxford

Date submitted: 11 Nov 2016 Electronic form version 1.4