

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Activation barrier scaling and crossover for noise-induced switching in a micromechanical parametric oscillator COREY STAMBAUGH, HO BUN CHAN, University of Florida — We explore fluctuation-induced switching in a parametrically-driven micromechanical torsional oscillator, a system far from thermal equilibrium. Under sufficiently strong parametric modulation of the spring constant, the oscillator possesses one, two or three stable attractors depending on the modulation frequency. Near the bifurcation points where the number of attractors changes, the activation barrier for switching out of a stable state is predicted to display universal, system-independent scaling relationships. We induce the oscillator to switch between the coexisting states by injecting noise in the excitation. By measuring the rate of random transitions as a function of noise intensity, we deduce the activation barrier as a function of frequency. Near both bifurcation points, the activation barriers are found to depend on frequency detuning with critical exponent of 2, consistent with the predicted universal scaling in parametrically driven systems. Away from the immediate vicinity of the bifurcation point, universal scaling relationships for the activation barrier no longer hold. At large detuning, we observe a crossover to a different power law dependence with an exponent that is specific to our device.

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Date submitted: 16 Nov 2006

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