

Abstract Submitted
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Complete cancellation of Duffing nonlinearity in atomically thin MoS₂ Nanoelectromechanical Systems CHANDAN SAMANTA, NISHTA ARORA, V KRANTHI KUMAR, SRINIVASAN RAGHAVAN, AKSHAY NAIK, Indian Inst of Science — Ultralow mass and extraordinary mechanical properties of atomically thin membrane make it an attractive alternative to conventional Nanoelectromechanical systems (NEMS) for various applications. As dimensions of these NEMS devices shrink down to atomically thin membrane, nonlinear effects dominate the linear response. Ability to control and manipulate these nonlinearities would thus be crucial for next generation of NEMS devices. Here, we present an electrostatic mechanism to completely cancel out the Duffing nonlinearity in atomically thin MoS₂-NEMS at room temperature. We observe a clear crossover from hardening to softening behavior with increasing DC gate voltage. As a direct consequence we observe about 30dB improvement in dynamic range of the devices. We also present the effect of inbuilt strain of the device on the cancellation of nonlinearity.

Chandan Samanta
Indian Inst of Science

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