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Frequency and nonlinearity tuning in NEMS resonators INNA KOZINSKY, Caltech, H.W.CH. POSTMA, Caltech, M.L. ROUKES, Caltech — Resonant devices based upon nanoelectromechanical systems (NEMS) are currently being developed for highly sensitive mass and force detection. The ability to tune the frequency of NEMS resonators in real time is indispensable for their use as sensors requiring both high precision and high frequency stability. We have explored a mechanism for tuning the resonant frequency of nanoscale silicon carbide resonators. We also demonstrate tuning of the nonlinearity in these devices and show how the linear operating regime can be restored at high (otherwise nonlinear) drive amplitudes and how dynamic range can be consequently increased. We present a theoretical model to explain these experimental observations, which also serves as a design guide for NEMS resonators with desired tunable properties.

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