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Title: Effect of hole-strain coupling on the eigenmodes of semiconductor-based nanomechanical systems

Abstract: Electron-phonon coupling can strongly affect the eigenmodes of nano- and micromechanical resonators. We study the effect of the coupling for p-doped semiconductor resonators.  We show that the backaction from the strain-induced redistribution of the holes between and within the energy bands can lead to a nonmonotonic dependence of the modes' eigenfrequencies on temperature and to a strong mode nonlinearity that also nonmonotonically depends on temperature. Unexpectedly, we find that the nonlinearity can nonmonotonically depend on the hole density. We also briefly discuss the effect of the coupling to holes on the modes' decay rates. The results are compared with the experiment.