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Role of the effective tensile strain in the electromechanical response of helical graphene nanoribbons with open and closed edges TRAIAN DUMITRICA, DONG-BO ZHANG, University of Minnesota — There is a growing need to understand the electronic properties of non-ideal graphene nanoribbons. Using objective molecular dynamics [1] and a density-functional based tight-binding model, we investigate the effects of torsion on the electromechanical properties of graphene nanoribbons with armchair edges. We propose to characterize with an effective tensile strain scalar [2] the torsional mechanical response, including a reverse Poynting effect, and the fundamental band gap modulations. The demonstrated utility of this concept in both the mechanical and electrical domains provides a perspective for understanding electromechanical response in a unified way, and for designing NEMS devices with graphene components. [1] T. Dumitric? and R.D. James, J. Mech. Phys. Sol. 55, 2206-2236 (2007). [2] D.-B. Zhang and T. Dumitric?, Small 7, 1023 (2011) .

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