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Simulation of Strain Induced Pseudomagnetic Fields in Graphene Suspended on MEMS Chevron Actuators[1] MOUNIKA VUTUKURU, JASON CHRISTOPHER, DAVID BISHOP, ANNA SWAN, Boston Univ — Graphene has been shown to withstand remarkable levels of mechanical strain an order of magnitude larger than bulk crystalline materials. This exceptional stretchability of graphene allows for the direct tuning of fundamental material properties, as well as for the investigation of novel physics such as generation of strain induced pseudomagnetic fields. However, current methods for strain such as polymer elongation or pressurized wells do not integrate well into devices. We propose microelectromechanical (MEMS) Chevron actuators as a reliable platform for applying strain to graphene. In addition to their advantageous controllable output force, low input power and ease of integration into existing technologies, MEMS allow for different strain orientations to optimize pseudomagnetic field generation in graphene. Here, we model nonuniform strain in suspended graphene on Chevron actuators using COMSOL Multiphysics. By simulating the deformation of the graphene geometry under the device actuation, we explore the pseudomagnetic field map induced by numerically calculating the components of the strain tensor. Our models provide the theoretical framework with which experimental analysis is compared, and optimize our MEMS designs for further exploration of novel physics in graphene.

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