Deformation of nanotubes/graphene by a transverse electric field

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If we bring a glass rod electrically charged by rubbing with silk, near a hair, the hair will be attracted to the rod. Here we demonstrate an approach to predict similar electrostatic phenomena occurring in nanoscale. This approach expands the applications of carbon nanotubes and graphene nanoribbons in nanoelectromechanical systems (NEMS), which allow direct conversion from electrical energy to nanoscale mechanical energy. The nanostructures are deflected in response to transverse gate voltages as a consequence of electric polarization. We demonstrate a strong dependence of the electrostatic deformation on both the field strength and the geometry of nano-objects. This field-induced deflection allows the nanostructures to oscillate at a frequency in a gigahertz range.

References:

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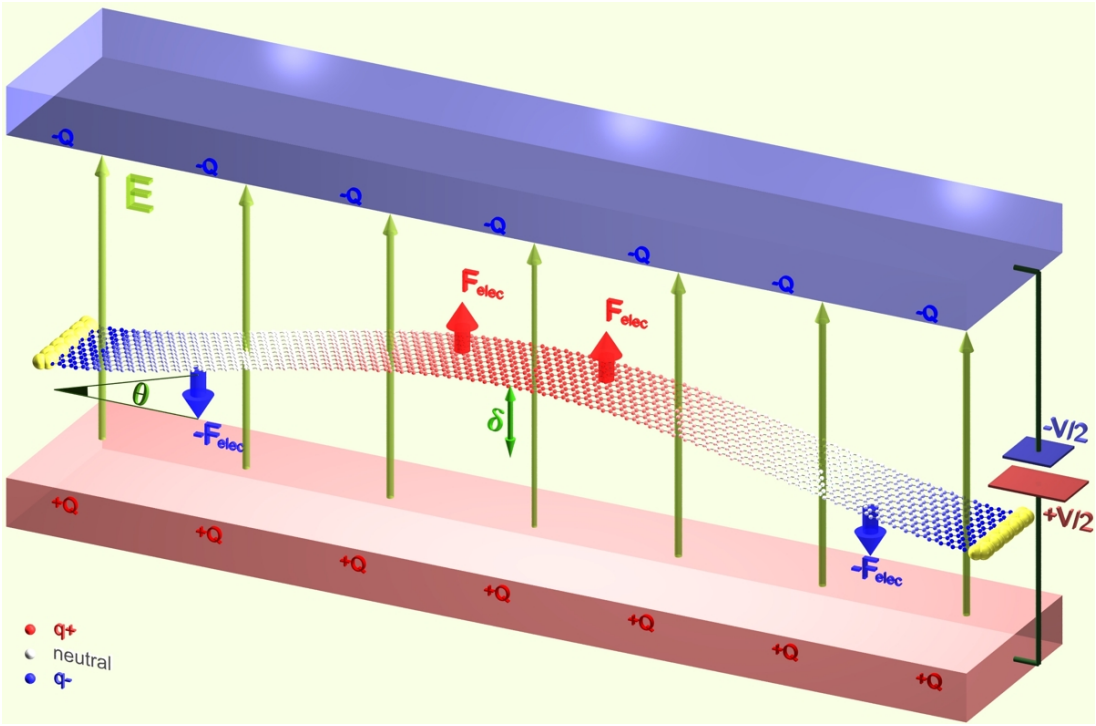

Figure 1: *Deformation of a graphene nanoribbon under a transverse gate voltage.*