Electronic transport in graphene with out-of-plane disorder

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Abstract

Due to its flexibility, graphene exhibits out-of-plane disorder in many realistic samples. Different shapes of disorders such as ripples, wrinkles, and folds, may emerge depending on the layer deformation. We explore the transport across these disorders in general shapes and orientations, with realistic atomic structures. Transport oscillations occur in commensurate graphene wrinkles due to an interference between intralayer and interlayer transport, while the general incommensurate wrinkles have vanishing backscattering and retain the transport properties of pristine graphene. Such suppression of backscattering reveals the effect of lattice commensuration on the electronic transport. We also address that the general rule of momentum matching, in the electronic transport across out-of-plane disorders, will help probe wrinkles and design nano electronic devices.