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Electronic properties of strained graphene: A new Dirac Hamiltonian that solves several issues in previous ones MAURICE OLIVA-LEYVA, GERARDO NAUMIS, Instituto de Física, UNAM — In the literature, strained graphene is usually described using a combination of tight-binding model and linear elasticity theory. This leads to the appearance of pseudomagnetic fields. However, as we will discuss, the resulting equations contains some problems. The most important is that the Fermi energy does not appears in the high-symmetry points of the reciprocal lattice as assumed in previous theories. In this work we consider the particular case of a uniform strain, which can be solved in some cases without any approximation. Then the dispersion relation is simply shifted and deformed. Among our results highlights [1], we present analytical expressions for the shift of the Dirac points and the corresponding Dirac-like equation, which cannot be derived from the usual theory of the strain-induced pseudomagnetic field. The obtained Dirac-like equation is tested against tight-binding computer simulations showing a good agreement. As an application, we generalize the frequency-dependent conductivity expression of graphene under uniform strain, which is calculated by using the Kubo formula. Finally, we discuss a generalization of our results, for the case of nonuniform strain.

[1] M. Oliva-Leyva, and G.G.Naumis, PRB 88, 08543 (2013).

Gerardo Naumis
Instituto de Física, UNAM

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