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Collective Modes of Electron Oscillation in Graphene Systems of Differing Dimensionalities BENJAMIN THOMPSON, BEN YU-KUANG HU, Univ of Akron, DEPARTMENT OF PHYSICS, UNIVERSITY OF AKRON COLLABORATION — In the attempt to effectively use the relatively-new material graphene, its properties must be more fully understood. Working toward this goal, this research looks at the oscillation of electrons in graphene and the effect these oscillations have on charge carriers in a surrounding, bulk, conductor. A quantum-mechanical model of these collective modes has already been created, so, here, a classically-mechanical model is used in order to see what details are lost by treating the system more simply. Conduction-band electrons were modeled as a plasma, of one species, subject to Maxwell's equations and Newton's Laws. The electric field created by the graphene collective modes was constructed and applied to the charge carriers in the external conductor, the motion of which was then analyzed. It is reasonable to suspect that graphene will be used, in conjunction with other materials, for any number of electrical applications and, before so doing, this research shows how accurately one must model the system in order to predict its behaviour.

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