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Plasmon damping in graphene out of equilibrium ZHIYUAN SUN, DIMITRI BASOV, MICHAEL FOGLER, Univ of California - San Diego — Motivated by recent experiments with graphene under high photoexcitation, we study theoretically plasmons of graphene in the two-temperature regime, i.e., the regime where electrons are much hotter than the lattice. We calculate the plasmon damping due to scattering of electrons by acoustic phonons, which is the dominant intrinsic contribution in clean graphene. As the system relaxes to equilibrium, the plasmon frequency adiabatically changes with time. We show that this causes a partial compensation of the plasmon damping. A similar mechanism may apply to another collective mode (the energy wave) predicted to exist in graphene in the low-frequency hydrodynamic regime. Implications for infrared and THz pump-probe experiments are discussed.

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