Coupled charge and phonon transport in graphene and new GFETs

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Lately, graphene has received a great attention due to its peculiar mechanical and electrical features., in particular it has a conductivity, which is one order of magnitude greater than the conventional semiconductors, and it is therefore considered as an ideal candidate for future electron devices. Charge transport in graphene has been investigated in several papers, but in the most part, the thermal effects of the crystal lattice are neglected. Indeed, self-heating is a major issue in nano-electronics and an efficient power removing system requires a good modeling of the behavior of the lattice temperature related to the charge transport under an applied electric field. Here, we include also the lattice temperature as dynamical variable. The complete model consists of the semiclassical Boltzmann equations for charges and for each population of phonons.
Applications to the design of novel GFET are presented as well.