Abstract Submitted
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Anisotropy and edge roughness scattering in the thermal conductivity of graphene nanoribbons[1] ZLATAN AKSAMIJA, IRENA KNEZEVIC, University of Wisconsin-Madison — We present a calculation of the thermal conductivity of graphene nanoribbons, based on solving the Boltzmann transport equation with the full phonon dispersions, a momentum-dependent model for edge roughness scattering, as well as three-phonon and isotope scattering. The interplay between strong edge roughness scattering and the anisotropy of the phonon dispersions results in thermal conduction that strongly depends on the chiral angle of the nanoribbon. A minimum occurs in the armchair direction and a maximum is attained in zig-zag nanoribbons. We also show that both the thermal conductivity and the amount of armchair/zig-zag anisotropy depend strongly on the width of the nanoribbon and the rms height of the edge roughness, with smallest and most anisotropic thermal conductivities occuring in narrow GNRs with rough edges. We conclude that physical width of the nanoribbon and the rms roughness of its line edges can be used along with angular direction as parameters to tailor the value of the thermal conductivity.

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