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Resonant tunneling through a finite-width potential barrier in graphene nanoribbons

This study aims at presenting the calculate the transmission probabilities of Dirac particles through a graphene nanoribbon (GNR) with a barrier-like potential. Using the Dirac equation with continuity condition for wave functions at the interfaces between regions with and without a potential, it was calculated the mode-dependent transmission probability for both semiconducting and metallic armchair-edge graphene nanoribbons (AGNRs). We verified that the transmission is an oscillating function of the height and width of the barrier for both AGNRs. Finally, we can have verified that, different from those for an infinite sheet of graphene system, the transport properties of AGNRs depends sensitively on their widths and edge details. This study is not only of vital importance for understanding the fundamental physics of the material, but also useful for designing novel devices or developing applications.

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