

536. Title:Alternating current Josephson effect in superconductor-graphene- superconductor junctions

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Source title:Journal of Applied Physics

Volume:109

Issue:8

Issue date:April 15, 2011

Publication year:2011

Language:English

Document type:Journal article (JA)

Abstract:We investigate the ac Josephson effect in superconductor-graphene- superconductor (SGS) junctions by using the Floquet-Green's function formalism to solve the Dirac-Bogoliubov-de Gennes equation. The numerical results show rich subharmonic gap structures such as the negative differential conductance (NDC) in the dc current. The tunability of the current magnitude can be controlled by the gate voltage, which determines the carriers' densities in graphene. With increasing bias, the ac components decay in an oscillatory manner as in superconductor-normal-superconductor junctions. It is found that the higher-order components have an explicit contribution to the total current under a low bias, which leads to the deviation from a simple sine-like dependence on time for the total current. The NDC characteristics and the tunable current magnitude are excellent hints for the potential application of SGS junctions.