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Title:Nonlinear effects in the Josephson-vortex terahertz photonic crystal: Second harmonic generation

Authors:Wall-Clarke, A. (1); Savel'ev, S. (1)

Author affiliation: (1) Univ Loughborough, Dept Phys, Loughborough LE11 3TU, Leics, England

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Abstract:This paper considers nonlinear effects on the propagation of Josephson plasma waves in the Josephson-vortex photonic crystal in layered superconductors with the possibility of exciting the second harmonic, tunable by magnetic field. This would enable an increase in the operable frequency of THz superconducting devices such as generators, detectors, and filters. We demonstrate numerically that the second harmonic can be strongly amplified for certain resonance frequencies. The linear spectrum for the second harmonic has also been analyzed, finding the possible resonance points with the first harmonic spectrum. An analytical approach describing a spatial distribution of the THz Josephson plasma waves at and near the resonances is also developed.

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