30
Accession number:20114514491871
Title:Terahertz instability of field effect transistor in quantum regime
Authors:Zhang, Li-Ping (1); Xue, Ju-Kui (1)
Author affiliation:(1) Key Laboratory of Atomic and Molecular Physics and Functional Materials of Gansu Province, College of Physics and Electronic Engineering, Northwest Normal University, Lanzhou 730070, China
Corresponding author:Xue, J.-K.(xuejk@nwnu.edu.cn)
Source title:Applied Physics Letters
Abbreviated source title:Appl Phys Lett
Volume:99
Issue:16
Issue date:October 17, 2011
Publication year:2011
Article number:163504
Language:English
ISSN:00036951
CODEN:APPLAB
Document type:Journal article (JA)
Publisher:American Institute of Physics, 2 Huntington Quadrangle, Suite N101, Melville, NY 11747-4502, United States
Abstract:The current-carrying state of a field effect transistor (FET) with asymmetric source and drain boundary conditions may become unstable and lead to generation of terahertz radiation. While previous studies of this instability are limited to the classical case, we extend this analysis to the nanometer FET with quantum effects. We find that quantum effects broaden the instability range of the drift velocity and enhance the radiation frequencies and the output power. These properties could make the nanometer FET advantageous for realization of practical terahertz oscillations.
Number of references:22