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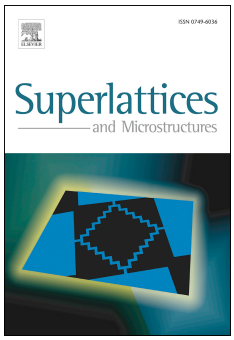

Tension induced surface plasmon-polaritons at graphene-based structure

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Tension induced surface plasmon-polaritons at graphene-based structure

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Abstract

Dispersion properties and field distributions of TM (or p-polarized) surface plasmon-polaritons have been investigated in the system that a strained graphene sheet cladded by two dielectrics. The outcomes show that graphene TM surface plasmon-polaritons are bound confined modes, and the field components penetrate into the dielectric layers in the rang that is very smaller than the wavelength in the free space. At low photon energies, when the tension is along the zigzag (armchair) direction and parallel (perpendicular) to the tangential electric field, the wavelength, propagation length and penetration depth of TM surface plasmon-polaritons increase (decrease) with increasing the strain. Changing the angle between the tension direction and tangential electric field at cases with the constant strain, cause to existence of TM surface plasmon-polaritons in the wider range of frequency.

Keywords: `Surface plasmon-polaritons; Graphene; Tension`

1. Introduction

Surface plasmon-polaritons (SPPs) are evanescent electromagnetic excitations that are coupled to oscillations of free electrons in a conductor and propagating along the conductor-dielectric interface [1, 2, 3]. Whereas the amplitudes of SPPs decay exponentially with increasing distance into each medium from the interface, SPPs are confined to the near vicinity of the conductor-dielectric interface. This confinement leads to an enhancement of the electromagnetic field at the interface, resulting in an extraordinary

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