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Title:A fast method for analysis of guided waves and radiation from a nano-scale slit loaded waveguide for a THz photoconductive source
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Abstract:A fast analysis method for a new terahertz waveguide for photo-mixing is proposed. The wave-guiding mixer structure is a modified parallel plate waveguide (PPWG) in which the top plate is replaced by a periodic array of sub-wavelength nano-slits. The substrate of the PPWG is made of a fast photoconductive material in which laser photomixing/absorption occurs. The characteristic equation of the modified PPWG when used as a THz waveguide is derived analytically, and its guided modes are studied in details over THz range of frequencies. The accuracy of the analytical results are verified by comparison with full-wave numerical simulations. The criteria for choosing the suitable mode for photomixing application are also discussed. Finally, based on dyadic Green's function representation, a systematic approach is provided for calculating the amplitude of the guided modes that are excited by an arbitrary photocurrent. © 2011-2012 IEEE.
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Main heading:Terahertz waves
Controlled terms:Green's function - Guided electromagnetic wave propagation - Millimeter waves - Photoconducting materials - Photoconductivity - Plates (structural components) - Waveguides
Uncontrolled terms:Analysis method - Analytical results - Characteristic equation - Dyadic green's functions - Fast methods - Guided modes - Loaded waveguides - Nano scale - Nanoslits - Parallel plate waveguide - Periodic arrays - Photoconductive materials - Photomixers - Photomixing - Plasmonic - Sub-wavelength - Terahertz waveguides - THz sources
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