Abstracts

Electric-Dipole Contributions to Resonant Far-Infrared Difference-Frequency Mixing in InSb

B.S. Wherrett, C.R. Pidgeon, N. Brignall and R.A. Wood. "Electric-Dipole Contributions to Resonant Far-Infrared Difference-Frequency Mixing in InSb." 1974 Transactions on Microwave Theory and Techniques 22.12 (Dec. 1974, Part I [T-MTT] (Special Issue on the Proceedings of the First International Conference on Submillimeter Waves and Their Applications)): 1100-1103.

Calculations have been made of the inversion-asymmetry-induced electric-dipole moment of the spin-resonance conduction-band transition in InSb. This moment leads to a second-order nonlinear polarization which resonates for difference-frequency mixing when the incident radiation frequencies differ by the spin-flip frequency. Comparison with experiments confirms that the dominant contribution to far-infrared difference mixing is from the magnetic-dipole source. However, it is shown that a value for the InSb-band parameter C may, in principle, be determined from the results of mixing experiments. It is also noted that electric fields in excess of 5 V/cm/sup -1/ should induce stronger mixing than given by the preceding two mechanisms. Observations of far-infrared radiation tunable over the range 85-105 cm/sup -1/ and at power levels of up to 10 µW are reported. These are obtained by mixing 10.6-µm TEA-CO/sub 2/-laser radiation with the tunable Stokes radiation produced by spin-flip Raman-laser action in an InSb sample. It is argued that considerable improvement in the power levels should be achieved by modifying the experimental setup.

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