Abstracts

Simulation of terahertz Doppler wavelength shifting of infrared optical pulses in an active semiconductor layer

I.V. Scherbatko, A.G. Nerukh and S. Iezekiel. "Simulation of terahertz Doppler wavelength shifting of infrared optical pulses in an active semiconductor layer." 2000 Transactions on Microwave Theory and Techniques 48.4 (Apr. 2000, Part II [T-MTT] (Special Issue on Terahertz Electronics)): 725-732.

In this paper, a time-domain model of wavelength shifting in a semiconductor layer with a constant stimulated gain level and moving Bragg grating of permittivity is used to investigate Doppler conversion of an infrared (f/sub 0/=200 THz) ultrashort (0.4-ps width) optical pulse. Simulations of the electromagnetic-field evolution show that the high drift velocity of carriers in InGaAsP can produce at least 1-THz conversion span. The optical power of the converted pulse can be as much as 20% of the power in the initial pulse. The backscattered pulses and pulses transmitted through the semiconductor layer depend dramatically on the permittivity modulation depth and length of the layer. It has been demonstrated that the length of the semiconductor layer can be optimized to produce strong converted pulses of short duration.

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