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Title:Theory of monochromatic terahertz generation via Cherenkov phase-matched difference frequency generation in $LiNbO_3$ crystal
Authors:Pengxiang Liu (1); Degang Xu (1); Hao Jiang (1); Zhuo Zhang (1); Kai Zhong (1); Yuye Wang (1); Jianquan Yao (1)
Author affiliation:(1) Inst. of Laser & Optoelectron., Tianjin Univ., Tianjin, China
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Abstract:A theory of Cherenkov phase-matched monochromatic terahertz (THz)-wave generation via difference frequency generation in a nonlinear crystal is developed. An experimental situation ($LiNbO_3$ pumped by dual-wavelength near-infrared nanosecond pulses) is considered. This theory accounts for the finite size of pump beam and allows us to explore the generation of transverse THz wave vector. The output characteristic of this THz source is analyzed based on the analytical expression, including radiation pattern, conversion efficiency, and tuning range. Calculated tuning curves are presented, which reasonably agree with previous experimental results. The influence of divergence of the focused pump beam on total radiated energy is studied in detail. Optimal pump beam size that maximizing generated THz energy is obtained.
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Inspec controlled terms:Cherenkov radiation - lithium compounds - microwave photonics - optical frequency conversion - optical materials - optical phase matching - optical pumping - optical tuning - terahertz wave generation
Uncontrolled terms:monochromatic terahertz generation - Cherenkov phase-matched difference frequency generation - Cherenkov phase-matched monochromatic terahertz (THz)-wave generation - nonlinear crystal - dual-wavelength near-infrared nanosecond pulses - transverse THz wave vector generation - THz source - radiation pattern - conversion efficiency - tuning curves - focused pump beam - radiated energy - optimal pump beam size - $LiNbO_3$
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Treatment:Theoretical or Mathematical (THR)

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