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Title:Terahertz generation with tilted-front laser pulses: Dynamic theory for low-absorbing crystals
Authors:Bakunov, Michael I. (1); Bodrov, Sergey B. (1); Mashkovich, Eugene A. (1)
Author affiliation:(1) University of Nizhny Novgorod, Nizhny Novgorod 603950, Russia; (2) Institute of Applied Physics, Russian Academy of Sciences, Nizhny Novgorod 603950, Russia
Corresponding author:Bakunov, M.I.(bakunov@rf.unn.ru)
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Abstract: A theory of terahertz emission from a femtosecond laser pulse with a tilted intensity front propagating through a prism-shaped electro-optic crystal is developed. The theory accounts for transient effects at the entrance boundary of the crystal and allows us to explore the dynamics of terahertz generation in the crystal. In particular, transverse walkoff length is introduced as an important parameter of the terahertz field formation process. Two typical experimental situations—LiNbO3 excited with a Ti:sapphire laser (0.8 μm wavelength) at room and cryogenic temperatures—are considered, and new schemes, in which GaAs at room temperature is excited at 1.8 and 3.5 μm, are proposed and analyzed. The parameters of the laser pulse (transverse size, tilt angle, and pulse duration) and crystal size maximizing the terahertz yield are calculated.
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