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Propagation Effects on THz Generation from Ionizing Two Color Laser Pulses LUKE JOHNSON, THOMAS ANTONSEN, JOHN PALASTRO, KI-YONG KIM, University of Maryland — Coherent mixing of an ultrashort laser pulse and its second harmonic in a gas cell produces THz radiation due to the nonlinear dependence of the ionization rate on field strength [1]. As this is a coherent process, propagation effects, including self-phase modulation, dispersion, and diffraction are important in determining the THz yield and are considered in this work. The laser pulses modeled have wavelengths of 800nm and 400nm, pulse widths of 50fs, and intensities of 10^{14} W/cm^2. The laser pulse propagation is modeled using the split-step Fourier method [2] to solve a first order differential equation for the forward (+z direction) propagating spectral components. Further, we have used ADK ionization to describe the ionization of N_2. The ionization current evolution is determined by solving a microscopic model where the free electrons are driven by the laser fields. To date, a 1D code with transverse fields and currents has been demonstrated. Future work includes extending the model to include diffraction and refraction.

[1] K. Y. Kim, "Generation of coherent terahertz radiation in ultrafast laser-gas interactions," Physics of Plasmas, vol. 16, 2009, p. 056706.
[2] M. Kolesik and J. Moloney, "Nonlinear optical pulse propagation simulation: From Maxwell's to unidirectional equations," Physical Review E, vol. 70, Sep. 2004, p. 036604.

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