394. Title:Comprehensive modeling of THz microscope with a sub-wavelength source
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Abstract:The sub-wavelength THz emission point on a nonlinear electrooptical crystal, used in broadband THz near-field emission microscopy, is computationally modeled as a radiating aperture of Gaussian intensity profile. This paper comprehensively studies the Gaussian aperture model in the THz near-field regime and validates the findings with dual-axis knife-edge experiments. Based on realistic parameter values, the model allows for THz beam characterisation in the near-field region for potential microscopy applications. An application example is demonstrated by scanning over a cyclic-olefin copolymer sample containing grooves placed sub-wavelengths apart. The nature of THz microscopy in the near-field is highly complex and traditionally based on experiments. The proposed validated numerical model therefore aids in the quantitative understanding of the performance parameters. Whilst in this paper we demonstrate the model on broadband electro-optical THz near-field emission microscopy, the model may apply without a loss of generality to other types of THz near-field focused beam techniques.