Phase-contrast THz-CT for non-destructive testing

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Abstract

In this talk, we consider the imaging problem of THz computed tomography (THz-CT), in particular for the non-destructive testing of extruded plastic profiles. We derive a general nonlinear mathematical model describing a full THz-CT experiment, and consider several approximations connecting THz-CT with standard computed tomography and the Radon transform. The derived models are based on geometrical optics, and contain both the THz signal amplitude and phase. We consider several reconstruction approaches using the corresponding phase-contrast sinograms, and compare them both qualitiatively and quantitatively on experimental data obtained from 3D-printed plastic profiles which were scanned with a THz time-domain spectrometer in transmission geometry.