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DK Seminar

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University of Vienna,
Faculty of Mathematics, OMP 1, HS 2

Cong Shi

University of Vienna

A new model for frequency-dependent attenuation in photoacoustic tomography

The classical formulations of PAT ignore the attenuation effect within the object which leads to inaccurate images. To correctly model the attenuation effect in a given media we need to investigate the relation between attenuation, dispersion and causality. We have proved that the illposedness of PAT problems increases when attenuation is taken into account. Some attenuation models are known to us and most of them are derived from the measured power law between attenuation and frequency. However, in certain parameter ranges they are not causal. In 2011, Kowar et al. proposed a new model which is causal in a much wider range but very complicated to analyze.

In this talk, I will introduce our new causal attenuation model that approximates the power law at low frequency and makes the PAT imaging process less ill-posed. The causality of this model is proved by a simple argument. The form of this model is similar to the classical power law but it permits the exponent to be greater than 1 without affecting causality.