ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Multi parameter identification in the nonlinear periodic Westervelt equation

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Chaired by Barbara Kaltenbacher | Department of Mathematics

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N.2.35

ABSTRACT

Nonlinear ultrasound imaging exploits harmonic wave generation to achieve improved contrast and spatial resolution beyond conventional linear techniques. A common model for finite-amplitude acoustic wave propagation in heterogeneous media is the Westervelt equation. In this talk, I will discuss an inverse problem for a periodic nonlinear Westervelt equation with heterogeneous coefficients and Robin-type boundary conditions. The aim is to reconstruct the sound speed, diffusivity, and nonlinearity parameters from partial boundary measurements. I will present analytical results on the Fréchet differentiability of the forward operator and a reference state approach that establishes linearized uniqueness for an all-at-once formulation of the inverse problem. Building on these results, I will introduce a frozen Newton-type reconstruction method and illustrate its performance through numerical experiments.

We hope to see you there!