ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

Invitation to the Doctoral Seminar

Benjamin Rainer
University of Klagenfurt

"Multi parameter identification in the nonlinear periodic Westervelt equation"

N.2.35 | Wednesday, 24 June 2026 | 10:00 a.m.

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.

Barbara Kaltenbacher and the Department of Mathematics look forward to seeing you at the talk!