ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Modeling, Analysis and Simulation of Nonlinear Ultrasound

Pascal Dominik Lehner | Universität Klagenfurt

Chaired by Barbara Kaltenbacher | Department of Mathematics

Wednesday, 12 June 2024 | 11:30–12:00

N.2.35

ABSTRACT

This presentation gives an overview of the modeling, analysis and simulation of nonlinear propagation of ultrasound. Ultrasound plays a crucial role in many relevant medical applications such as diagnostic imaging, lithotripsy, cancer treatment, gene transfection and tissue ablation.

The talk begins with the current state of the art in modeling nonlinear acoustics based on the Navier-Stokes equations. From this, standard models of nonlinear acoustics such as Kuznetsov's equation can be derived. In this presentation, however, we will focus on a new first order in time nonlinear wave equation. The corresponding analysis of the well-posedness of this new equation is briefly outlined. Then, possible numerical methods that can incorporate parallelizability and adaptivity to obtain efficient numerical solvers are presented. Finally, open research questions are addressed.

We hope to see you there!