ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Imaging with Nonlinear Ultrasound Waves: Modeling, Analysis and Numerics

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Chaired by Barbara Kaltenbacher | Department of Mathematics

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ABSTRACT

Ultrasound imaging is a well-established method that uses high frequency sound waves to view inside the body. At higher frequencies sound propagation is affected by scattering and stronger attenuation. So, nonlinear effects can be observed and exploiting them can enhance the image quality. Therefore, novel ultrasound-based techniques such as nonlinearity parameter imaging, harmonic imaging, and vibro-acoustography have been put forward. While in linear approximations model simplifications allow to reduce the imaging problem to a signal processing task, including nonlinearities starts from a fundamentally different modelling approach. It is based on the constitutive laws and physical balance which leads to PDEs, or more precisely nonlinear wave equations. Consequently, imaging with nonlinear ultrasound waves needs to be considered as an inverse problem for a nonlinear PDE. In this talk, I want to introduce you to this topic and present the derivation of a paraxial model in vibro-acoustography.

We hope to see you there!

