ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

The periodic nonlinear Westervelt equation: Well-posedness, numerical solutions and the saturation effect

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Chaired by Barbara Kaltenbacher | Department of Mathematics

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ABSTRACT

The nonlinear Westervelt equation is a widely used model for nonlinear acoustic wave propagation and is particularly relevant in modern ultrasound imaging, where nonlinear effects are exploited to enhance image quality. In this talk, we study a periodic version of the Westervelt equation with localized excitations and Robin boundary conditions in two and three space dimensions. We begin with a brief discussion of well-posedness, both in the linear and nonlinear settings, allowing for spatially varying coefficients that naturally arise in quantitative imaging applications. We then introduce a multiharmonic formulation that captures the generation of higher harmonics due to nonlinear wave propagation. Finally, we present numerical results based on a finite element discretization of the resulting Helmholtz system, illustrating nonlinear acoustic wave propagation and highlighting the saturation effect.

We hope to see you there!

