

MIXED FINITE ELEMENT FORMULATIONS FOR THE KUZNETSOV EQUATION

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ABSTRACT

Accurate simulation of nonlinear acoustic waves is crucial for the continued development of a wide range of ultrasound applications. In this talk, we will present the analysis of mixed finite element formulations of a classical quasilinear model of ultrasonic wave propagation, the Kuznetsov equation. Such formulations allow simultaneous retrieval of the acoustic particle velocity and either the pressure or acoustic velocity potential, thus characterizing the complete ultrasonic field at once. Using non-standard energy arguments and a fixed-point technique, we establish sufficient conditions for the well-posedness, stability, and optimal *a priori* errors in the energy norm for both potential-velocity and pressure-velocity versions of the semi-discrete Kuznetsov equation. Numerical experiments will illustrate the theoretical findings. The talk is based on joint work with Mostafa Meliani (Radboud University).

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