

Texas Tech University. Applied Mathematics Seminar.

Symplectic-Mixed Finite Element Approximation of Linear Wave Equations

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Room: MATH 016. Time: 4:00pm.

ABSTRACT. We apply mixed finite element approximations to the first-order form of the acoustic wave equation. Our semidiscrete method exactly conserves the system energy, and we show that with a symplectic Euler time discretization, our method exactly conserves a perturbed energy quantity that is positive-definite and equivalent to the actual energy under a CFL condition. In addition to proving optimal-order $L^\infty(L^2)$ estimates for our methods, we also develop a bootstrap technique that allows us to derive stability and error bounds for the time derivatives and divergence of the vector variable beyond the standard under some additional regularity assumptions.