A POSTERIORI ERROR ESTIMATION FOR SECOND-ORDER HYPERBOLIC PROBLEMS

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To date most of the research on a posteriori error estimation has been confined to second-order elliptic boundary value problems. In this talk we present a posteriori error estimates for second-order hyperbolic problems. Babuška and Yu constructed a posteriori estimates for finite element discretization errors of linear elliptic problems utilizing a dichotomy principle where the errors of odd-order approximations are computed form jumps in first derivatives while errors of even-order approximations are computed by solving a set of local problems. We discuss similar a posteriori estimates for the spatial errors of finite element solutions of linear second-order hyperbolic partial differential equations on square-element meshes. Error estimates computed in this manner are proven to be asymptotically correct; thus, they converge in strain energy under mesh refinement at the same rate as the actual errors. Furthermore, computational results show that these error estimates apply to rectangular and quadrilateral meshes. We will also discuss the efficiency of even-odd error estimates for nonlinear problems and general finite element spaces.