

Some Problems in the Numerical Analysis of Elastic Waves

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The focus of our research has been the development of reliable and efficient numerical methods for simulating waves in the time domain. In particular we are interested in developing robust but efficient, high-order volume discretizations along with radiation boundary conditions which provide arbitrary accuracy at small cost. For acoustic and electromagnetic waves, we believe we have methods which successfully meet these challenges. However, their extension to elastic waves leads to new difficulties, very often associated with free surface boundary conditions. This includes inaccurate propagation of Rayleigh waves, as well as instabilities or poor convergence of standard radiation boundary condition sequences and PMLs due to the creation of reverse modes. We will illustrate these difficulties and discuss various successful methods to circumvent them.