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Abstract

The Reciprocal Absorbing Boundary Condition (RABC) was recently introduced as an approach toward solution of elastic wave propagation problems in unbounded layered media. The idea underlying RABC is the application of time-domain reciprocity theorems which are valid not only for bounded but also for unbounded domains. Since these theorems involve the convolution integral of complete response time histories on the entire edge of the computational domain, the RABC is considered a "global" absorbing boundary condition in space and time. The "exact" nature of this approach offers accurate and effective treament of wave propagation in infinite domains.

We present in this paper an extension of RABC to the transient analysis of acoustic wave propagation. For the purpose of computations, we use a velocity-potential formulation of the wave equation. Multiple segments of the reciprocal absorbing boundary can be employed in arbitrary orientations, thus facilitating truncation of the unbounded domain.

The performance of RABC when applied to acoustic media is demonstrated via numerical examples, including wave propagation and excitation of a cylindrical cavity embedded in an infinite channel.

Keywords: acoustic wave propagation; absorbing boundary conditions; reciprocity theorems; finite elements

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