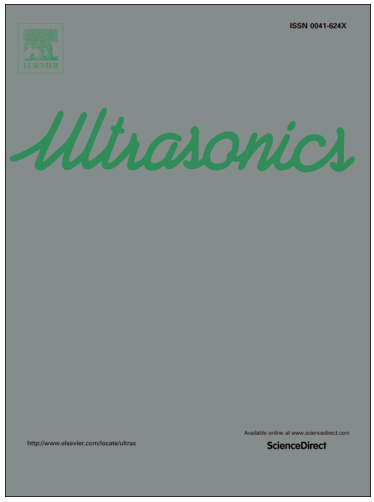

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An Algorithm for Quantitatively Modeling Reflected Ultrasonic Bounded Pulses and Beams

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Abstract

The study of the reflected acoustic waves plays an important role in our understanding of media. We provide an algorithm to propagate the ultrasonic bounded beam source and study its reflection from any horizontal and homogenous water-solid boundary. This algorithm implements a hybrid combination of the phase-advance wavefield continuation in the frequency domain and the complex analytic solution for the acoustic reflectivity. The peak amplitude of the specularly reflected beam is in agreement with the laboratory measured acoustic reflection from water-Aluminum and water-Copper alloy boundaries. The algorithm is able to model the observed critical reflection as well as the null in the reflected amplitude at the Rayleigh critical angle from the acoustic wave. This algorithm is a crucial tool to understand the full reflected wave from material immersed in water in any azimuthal or incidental angles. The software of this algorithm and acoustic reflectivity from both solid materials are provided.

Keywords: bounded beam, ultrasonic, reflectivity,

Highlights: