

ACOUSTICS2008/2781 Varied Amplitude method in Time Reversal Acoustic land mine

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Acoustic methods of land mine detection are being developed for nonmetal mines where conventional electromagnetic methods fail. One such method, based on time reversal acoustic principles, is the Phase-inversion method; which detects quadratic and even ordered harmonic nonlinearities in the surface vibration above a mine. While this has shown higher sensitivity than linear methods it cannot detect all nonlinear components. These components can be detected by the Varied Amplitude method that is based on wide band excitation of surface vibration using the principles of time reversal acoustics. The nonlinear effects are measured for surface vibrations with different amplitudes and the normalized received signals can then be subtracted to reveal all the nonlinear components. We conducted a set of experiments using a box with six loudspeaker and an array of spatially distributed geophones to measure the linear and nonlinear components for various types of mines in different soils. Information about nonlinear components' spatial distribution allows one to observe greater mine/no mine contrast than with linear and other nonlinear techniques. [Work was supported by the U.S. Army RDECOM CERDEC Night Vision and Electronic Sensors Directorate.]