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**The detection and characterization of buried resonant targets by
iterative, single-channel time reversal**

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A technique for detecting buried resonant targets is described in which enhanced signal-to-noise ratio and convergence to a narrowband signal is achieved using the iterative time reversal of backscattered echo returns. [Waters et al., *J. Acoust. Soc. Am.* 122, 3023 (2007).] The center frequency of the converged-upon signal is typically a resonance frequency of the target and thus could be used for classification and identification purposes. This technique could offer a straightforward means for enhancing target return levels in a noisy or cluttered environment using existing SONAR systems. The procedure consists of exciting the transducer with a broadband pulse, digitizing the echo return windowed about the target, reversing the data stream in time, and using this signal as the source waveform for the next interrogation pulse. We report results derived from a multi-pronged investigation that includes numerical modeling, high-frequency (100 kHz - 2 MHz) scaled tank experiments employing both free-field and buried targets, and mid-frequency (20 kHz -200 kHz) buried target experiments run in a shallow pond. [Work supported by The Office of Naval Research and the Center for Subsurface Sensing and Imaging Systems (NSF ERC Award No. EEC-9986821).]