

ACOUSTICS2008/875
**Detection of a resonant target buried in sediment using iterative
time reversal: mid-frequency pond experiments**

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Iterative time reversal techniques developed at smaller scales, [Waters et al., J. Acoust. Soc. Am. 122, 3023 (2007)], are applied to the detection of a 15 cm diameter stainless steel shell buried in sandy sediment at the acoustic test pond at the Naval Surface Warfare Center - Panama City Division. A mid-frequency, directional projector is located 1.5 m above the sediment and directed normally to it. A hydrophone is located midway between the sediment and the projector. This system gives a response between 20 kHz and 200 kHz. A calibration filter is designed using the direct path response between the projector and hydrophone. This filter is applied at each time reversal iteration to prevent the time reversal technique from converging to the transducer resonance. Application of iterative time reversal allows the detection of the target at greater depths than otherwise possible due to the resonance scattering of the target. Additional experiments explore the application of filters, and the effect of different window sizes. Also, comparisons with similar laboratory experiments and comments on real world applications are discussed. [Work supported by the Office of Naval Research.]