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**Bi-static scattering from buried, elastic objects in shallow water waveguides**

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The emerging autonomous network technology is enabling new operational paradigms for the concurrent detection, classification and localization of seabed objects by collaborating AUVs. Thus, such networks can exploit the bi-static enhancement of targets which are stealthy to conventional mono-static sonars, and the resonance properties of manmade targets. Under the GOATS and SWAMSI programs MIT in collaboration with NURC have addressed the fundamental issues associated with the development of such a new sonar concept. Through a series of joint experiments, various aspects of the interaction of elastic targets, completely or partially buried in the seabed have been investigated, including the evanescent coupling of low-frequency sound (1-10kHz) into the seabed, the coupling with structural waves in the targets, and the 3D scattering back into the water column. The analysis is performed using a spectral virtual source scattering model with an embedded spectral Green's function generator which incorporates all multiple scattering effects between the target and the seabed. The target response is represented uniquely by an impedance matrix which may be computed separately using analytical or numerical methods, depending on the target geometry. The scattering model has been combined with the OASES code to provide a comprehensive simulation environment including all the shallow water waveguide physics.[Work Supported by ONR].