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Remote Acoustic Profiling of the Ocean Sound Speed

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The ocean Sound Speed Profile directly affects how acoustic waves propagate in the ocean. As a result, knowledge of the sound speed profile is important in many underwater acoustic applications including acoustic imaging, source localization, and underwater communication. Measurement of ocean sound speed can also provide an indirect measure of ocean temperature using the close dependence of sound speed on water temperature. Our presentation focuses on remote estimation of the ocean sound speed profile by using an underwater acoustic pulse-echo method. We propose the use of a directional transmitter and a number of receivers offset at a comparatively small distance from the transmitter location. Sound is scattered by naturally occurring targets and these signals are detected by the receiving array. The arrival time and phase in the detected signals contains information on the location of these targets and importantly, the sound speed through the water column. Sound speed estimates can be generated directly by the arrival time data but we propose the use of an inverse approach working with the phase in the signals that allows for greater accuracy in the sound speed estimates. The viability of our approach is demonstrated through use of an acoustic model that generates simulated received signals for our system geometry. We are using the model analysis to guide in the design of a prototype system for future field trials.

Keyword-1

Acoustics

Keyword-2

Instrumentation

Keyword-3

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