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Estimation of some geoacoustic parameters of a tank experiment by match field processing

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The work deals with an inversion procedure for the estimation of geometrical and environmental parameters of a simulated shallow water environment. Two of the most significant parameters in a shallow water environment affecting the acoustic field in long range acoustic propagation are the sound speed of the sediment and the depth of the water column. The accurate estimation of these parameters is perhaps the most important task in scaled laboratory experiments. Therefore, the calibration phase of such an experiment involves the estimation of these parameters, preferably using acoustical techniques, regardless the final scope of the experiment. The present work describes an inversion procedure based on standard match field processing. The acoustic signal used was a short gaussian shaped pulse and it was recorded at a certain distance from the source and for several depths in the water column. The spectrum of the recorded signal was obtained using FFT and the complex acoustic field at the central frequency was calculated. The estimated values of the water depth and the sound speed in the sand which was used to simulate the sea-bed, were found in accordance with the observed modal structure of the acoustic field.