Master MIR – Underwater Acoustics
2024-2025

Homework 2

Let us consider a water channel, h in depth, and let us assume that the velocity c is constant and equal to 1500 m/s. A signal is transmitted from a point-like source in the water and measured by a set of 9 receivers located along a vertical line at depths 25*n meters, $1 \leq n \leq 9$. When hitting the (flat) boundaries, the acoustic waves are totally reflected (reflection coefficient $r = -1$).

The file 'Received.mat' contains a 9 x 32000 array which provides the 9 received signals during 6.4 s with sampling path dt = 2.e-04 s. Line n corresponds to the receiver at depth 25*n meters.

Plot the received signals and explain how you can get a rough estimation of the depth h and of the location of the transmitter from the various time delays. Improve the accuracy of this first estimate thanks to the simulation of the back propagation of the time-reversed received signals.