

# A Semi-Blind Method for Localization of Underwater Acoustic Sources

## MATLAB Package

This MATLAB Package is provided as supplemental material to the paper:

Amir Weiss, Toros Arikan, Hari Vishnu, Grant B. Deane, Andrew C. Singer, and Gregory W. Wornell, “A Semi-Blind Method for Localization of Underwater Acoustic Sources”, *IEEE Trans. on Signal Processing*, May 2022.

### Content

This package contains two files (not including this instruction file):

1. `compute_SBL_cost_function.m`
2. `compute_SBL_estimate.m`
3. `compute_FIM_3ray_model.m`
4. `Script_SBL.m`

### Description

1. `compute_SBL_cost_function.m` – This function computes the cost function of the SBL estimate at a specified source position. The inputs are the Discrete Fourier Transforms (DFTs) of the received signals from all the receivers, as well as necessary additional parameter (such as speed of sound, bottom depth etc.).

Note: The file does not contains additional local functions, and is self-contained.

For more details see the in-code documentation in the file.

2. `compute_SBL_estimate.m` – This function computes the SBL estimator in a given volume of interest. The implementation follows the pseudo code presented in the paper (Section IV, p.4).

For more details see the in-code documentation in the file.

3. `compute_FIM_3ray_model.m` – This function computes the Fisher information matrix, which readily gives Cramér-Rao lower bound, of all the unknown parameters in the three-ray model.
4. `Script_SBL.m` – This script demonstrates the execution of all the functions above for a synthetic signal, generated according to the (frequency-domain) three-ray model (see eq. (6), Subsection II-A).