13.853 Computational Ocean Acoustics
Homework #2
Assigned: Session 6
Due: Session 10

Problem 1

Write a MATLAB code for computing the depth-dependent Green's function (DDGF) in a stratified ocean, including an upper halfspace which may be fluid (e.g. air) or vacuum, a sequence of up to 4 fluid layers, and a lower, fluid halfspace, using the Direct Global Matrix (DGM) method, and let the horizontal wavenumber be complex, $k_r = k_r(1 - i\delta)$. The source may be present in any of the layers and halfspaces. As part of your answer, include the following:

- Describe your mapping of the local layer degrees of freedom and interface conditions into a stable global system.
- Write your own equation solver, dedicated to structure of the DGM.
- Sanity checks including transparent interfaces, e.g. computing the DDGF for an infinite medium with a 3-layer model.
- Demonstrate stability for problems involving a layer with strongly evanescent field.
- Convert the DDGF to the kernel for Transmission Loss Pressure.
- Compute the DDGF for a point source in a fluid halfpace, and compare your result to Fig. 2.7 of Computational Ocean Acoustics.