ACOUSTICS2008/2401
Geoacoustic Adjoint-Based Inversion via the Parabolic Equation

John Papadakis[a], Jean-Pierre Hermand[b], Evangelia Flouri[a] and Matthias Meyer[c,b]

[a]Institute of Applied & Computational Mathematics, Foundation for Research and Technology-Hellas (FORTH), Vassilika Vouton, P.O. Box 1385, GR-71110 Heraklion, Greece

[b]Université libre de Bruxelles (U.L.B.) - Environmental hydroacoustics lab, av. Franklin D. Roosevelt 50, CP 194/5, 1050 Bruxelles, Belgium

[c]Royal Netherlands Naval College (NLDA) - REA group, PO Box 10000, 1780 Den Helder, Netherlands

In this paper an analytic method is exhibited for recovering the acoustic parameters of the sub-bottom region in the ocean. The acoustic propagation problem is modeled via the wide angle parabolic equation and the bottom boundary condition used is in the form of a Neumann to Dirichlet or Dirichlet to Neumann map. The sub-bottom region is assumed homogeneous or horizontally stratified with homogeneous layers. The inversion is modeled as an optimal control problem, and the solution is based on the adjoint method. Several cost functions are introduced which make use of the relative amplitude of the observed complex field. The method is applied to several test cases and satisfactory convergence of the inversion scheme is exhibited.