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**Adjoint modeling for Acoustic Inversion based on an Adjoint  
Parabolic Equation**

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In this paper the acoustic propagation problem is modeled by the wide angle parabolic equation and the bottom boundary condition is in the form of a Neumann to Dirichlet map. We formulate the inversion as an optimal control problem, the control parameters being the sound speed in the water and the sound speed, density and attenuation in the bottom. Using the adjoint operator to the wide angle parabolic equation, an inversion scheme is derived for the acoustic parameters of the water column and the bottom region. The optimization approach used is the method of steepest decent. Several test cases are exhibited.