

# **Implementation of Pseudospectral Method for the Solution of the Wave Equation in Acoustic Media and Comparison with Finite-Difference Method**

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## **ABSTRACT**

A numerical solution to the wave equation in heterogeneous acoustic media is presented. This equation is written by spatial and temporal differential operators for field compressional  $P$ , this field is a function of the spatial and time coordinates. The derivative with respect to time is solved using an approximation of second order through operators of centered finite-differences. Furthermore the partial derivatives are calculated using pseudospectral method. This method applies the Fourier transform to obtain the field ( $P$ ) in wave number domain. The advantage of using this method is associated with a reduced numerical dispersion, this means that when using a large mesh step the pseudospectral method obtains better results than finite-differences, which needs a fine mesh. A comparison between this method and the finite difference method for some simple models in two dimensions is presented. Finally the results of the numerical dispersion and the computational cost of these methods are also shown