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SEISMIC MODELING IN HETEROGENEOUS MEDIA

ABSTRACT

Seismic modeling or generation of theoretical seismograms is an essential tool for the interpretation and understanding of field seismograms recorded in areas of complex geology. Synthetic seismograms are also essential to evaluating performance of seismic processing algorithms. Several techniques already exist. However, most of these are either based on simplistic assumptions or are too slow to run even on the fastest computer. As new technology is being developed to acquire multi-component, VSP and 3D seismic data, there is a tremendous need for techniques of seismic modeling that are fast and accurate. The first phase of my research specifically addresses this issue.

Specifically, my research focuses on the development of two methods of seismogram synthesis:

1. Wave number Coupling Method (Laterally varying Reflectivity Method), and
2. Ray-Born Method.

In the first method, lateral heterogeneity is taken into account by coupling of wave numbers between incident plane wave and the spectrum of the heterogeneous media. I have done the theoretical development only. The second method is basically a numerical method based on a high frequency and first order born approximation. I have implemented this technique for modeling in anisotropic media. I plan to apply these techniques for the analysis of multi-component VSP data offshore Oregon.

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DHANANJAY KUMAR

VITA:

Dhananjay Kumar attended high school in Patna, India. After that, he entered the Department of Geology and Geophysics at the Indian Institute of Technology, Kharagpur, India in July 1995. He graduated with a Master of Science degree in Exploration Geophysics in June 2000. After his graduation, he was employed as a Petroleum Geophysicist at Reliance Industries Limited, India, where he worked from June 2000 to July 2001. In August 2001, he enrolled in the Ph.D. program in the Department of Geological Sciences at the University of Texas at Austin. He is working with Dr. Mrinal Sen on Seismic Modeling and Data Analysis in Inhomogeneous and Anisotropic media.

M.Sc. thesis (at IIT): Three Dimensional Forward Modeling and Inversion of Magnetotelluric Data.

Ph.D. thesis : Seismic Modeling and Data Analysis in Heterogeneous Media.