

Estimation of Parameters by Theory of Inverse Problems and Search Metaheuristics for the Inversion of the Zoeppritz Equations

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Abstract

The recognition of materials and structures inside of the earth is a problem that has always remained present in both science and industry. Seismic is a branch of geophysics that helps in the characterization and analysis of the Earth's crust. In addition to the information that seismic can provide, there are particular cases of methodologies used for the analysis of certain physical properties that have the subsoil materials, these are known as seismic attributes. The AVO (Amplitude Vs. Offset) is a seismic attribute that seeks to quantify physical parameters of materials in the Earth structure for the purpose of an easy classification, these are based on the equations of Zoeppritz, which directly describe The relation between the amplitudes of the reflected and transmitted waves in a material from three physical properties, which are: the speed at which the waves P and S travel through two means delimited by an interface and its density. Using evolutionary programming, the theory of inverse problems and the a priori information of a controlled experiment, we will seek to solve the Zoeppritz equations as an ill-posed problem in order to estimate the geophysical parameters for the different seismic bodies of a proposed model.

References

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