عنوان مقاله:

THREE-DIMENSIONAL (3D) THREE-COMPONENT (3C) REFRACTOR SEISMIC IMAGES TO RECOGNIZE HIDDEN FAULT ZONES WITH GRM SSM

محل انتشار:

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خلاصه مقاله:

The objective of the seismic refraction method is to determine the velocity distribution in the sub-surface. The seismic refraction method does have a number of advantages over the reflection method, particularly in shallow investigations such as in geotechnical, environmental and groundwater applications. The seismic refraction methods seek to measure the spatial variation of petrophysical parameters by using seismic velocity. Three-dimensional (3D) threecomponent (3C) shallow seismic refraction surveys were recorded at two sites in the Spicers Creek Catchment, near Dubbo in southeastern Australia. The seismic data were recorded with the Australian National Seismic Imaging Resources (ANSIR) 360-trace ARAM-24 seismic system and IVI MiniVibrator. Termed the GRM SSM (for statics smoothing method), it essentially generates a time-depth model of the refracting interface for which the effects of the near surface irregularities have been minimized, by taking an average of the time-depth profiles for a range of XY values. The GRM SSM, which takes advantage of the unique redundancy properties of the GRM computations, was a major factor in deriving consistent detailed starting models for refraction inversion. Furthermore, this consistency was achieved with both S-wave components, as well as the P-wave results. The results of the seismic refraction surveys show that the cross cutting faults occurs as a narrow region with low seismic velocities and increased depths of weathering. The measurement of S-wave velocities provided a measure of Poisson's ratio, which is a useful elastic parameter. Although a detailed analysis of the head wave amplitudes did not generate useful results, nevertheless, the fact that the head wave amplitude is a function of the densities, as well as the seismic velocities, suggests that the joint inversion of seismic refraction traveltimes and head wave amplitudes, with detailed gravity profiles, should facilitate the determination of both seismic velocity and density models, and in turn, the derivation of elastic constants. It is likely that the detailed geotechnical characterization of sites with 3D 3C seismic refraction methods, together with detailed gravity profiles, could provide useful quantitative models for the analysis of groundwater flow in fractured rock masses, as well as for the traditional engineering construction site applications.

کلمات کلیدی:

Seismic Refraction, GRM SSM, Fault Zones, Geotechnical Characterization