APPLICATION OF SHALLOW SEISMIC REFRACTION FOR DETERMINING GEOTECHNICAL PROPERTIES AND COMPETENCE OF KARSTIC LIMESTONE BEDROCK IN AN AREA WEST OF ASSIUT, EGYPT

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Abstract:

The main objective of this study was to determine the geotechnical properties of subsurface karstic limestone bedrock on the lower Eocene plateau, west of Assiut, Egypt. A shallow seismic refraction survey was conducted along eight profiles in different directions using a 12-channel exploration seismograph (Geometrics Model 1225). The P-wave seismic velocities were recorded using in-line spread and vertical geophones while the S-wave seismic velocities were recorded using horizontal geophones. The seismic refraction technique is considered a powerful tool for computing the kinetic elastic moduli and other geotechnical properties, which give important information about the degree of consolidation and the material competence of foundations. These geotechnical properties for foundation bedrock were calculated and presented in contour maps. The presence or absence of competent and high quality material at the foundation location define its suitability for constructing buildings and civil engineering projects. It was found that the P-wave seismic velocities range from 2800 to 4500 m/s and the S-wave seismic velocities range from 1600 to 2750 m/s. It was also concluded that the values of elastic moduli measured in the petrophysical laboratory are consistent with the results obtained from the field. Also, the computed geotechnical properties within the bedrock have been used for dividing the study area into three zones of different rock competence.

Keywords:

Seismic Refraction, Geotechnical Properties, Karstic Limestone Bedrock

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