عنوان مقاله:

Assessing the Performance of Statistical-structural and Geostatistical Methods in Estimating the 3D Distribution of the Uniaxial Compressive Strength Parameter in the Sarcheshmeh Porphyry Copper Deposit

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خلاصه مقاله:

The uniaxial compressive strength (UCS) of intact rocks is an important geotechnical parameter required for designing geotechnical and mining engineering projects. Obtaining accurate estimates of the rock mass UCS parameter throughout a 3D geological model of the deposit is vital for determining optimum rock slope stability, designing new exploratory and blast boreholes, mine planning, optimizing the production schedule and even designing the crusher's feed size. The main objective of this paper is to select the preferred estimator of the UCS parameter based on accuracy performance using all the available geological-geotechnical data at the Sarcheshmeh copper deposit, located 160 km southwest of Kerman City, in south-eastern Iran. In this paper, an attempt is made to estimate the spatial distribution of the UCS parameter using commonly-used statistical-structural and geostatistical methods. In order to achieve the aim of the current study, the UCS parameter was measured along with other qualitative geological properties, including the rock type, weathering, alteration type and intensity of core samples taken from 647 boreholes. The 3D distribution of the UCS parameter is obtained using different algorithms including statistical-structural (the nearest-neighbour technique), linear (ordinary Kriging) and nonlinear (indicator Kriging) geostatistical methods. After estimating the UCS parameter at block centres using the above-mentioned methods, the performance of each method is compared and validated through 21 set aside borehole data. The assessment of selecting best estimator of UCS parameter is based on scatter plots of the observed versus estimated data plus the root mean square error (RMSE) statistics of the differences between observed and estimated values for 21 set aside borehole data. Finally, due to the special characteristics of the UCS spatial variability, it is concluded that the nearest-neighbour method is the most appropriate method for estimating the UCS parameter in porphyry copper deposits.Keywords: indicator Kriging, nearest-neighbour

کلمات کلیدی:

indicator Kriging, nearest-neighbour, ordinary Kriging, sarcheshmeh copper deposit, uniaxial compressive strength (UCS)

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