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The Comparison of Joint Simulation and Estimation Methods for the Geometallurgical Modeling

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Abstract : This paper endeavors to construct a block model to assess grinding energy consumption (CCE) and pinpoint blocks with the highest potential for energy usage during the grinding process within a specified region. Leveraging geostatistical techniques, particularly joint estimation, or simulation, based on geometallurgical data from various mineral processing stages, our objective is to forecast CCE across the study area. The dataset encompasses variables obtained from 2754 drill samples and a block model comprising 4680 blocks. The initial analysis encompassed exploratory data examination, variography, multivariate analysis, and the delineation of geological and structural units. Subsequent analysis involved the assessment of contacts between these units and the estimation of CCE via cokriging, considering its correlation with SPI. The selection of blocks exhibiting maximum CCE holds paramount importance for cost estimation, production planning, and risk mitigation. The study conducted exploratory data analysis on lithology, rock type, and failure variables, revealing seamless boundaries between geometallurgical units. Simulation methods, such as Plurigaussian and Turning band, demonstrated more realistic outcomes compared to cokriging, owing to the inherent characteristics of geometallurgical data and the limitations of kriging methods.

Keywords : geometallurgy, multivariate analysis, plurigaussian, turning band method, cokriging
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