

Comparison between Kriging and Inverse distance methods for improving extraction blocks grade control in Sarcheshmeh copper mine

Mohammad Jalali*

*M.Sc in mining exploration. Consultant engineer of Earth Crust Researchers.
m.jalali1984@gmail.com*

Esmail Asadi

*M.Sc in mining exploration , mineral and industrial organization of Saveh
asadi_ned@yahoo.com*

Mohammad Reza Kargar Dianati

*Head of ore production and control, Sarcheshmeh Copper Complex, Sarcheshmeh, Iran
dianati@nicico.com*

Gholam Reza rahimipour

*Mining Eng. Department, Kerman University, Iran.
rahimipour@mail.uk.ac.ir*

ABSTRACT

Producing fix tonnage and grade is the most important process that each mine is dealing with it. This knowledge is improved by using both of extraction and exploration data with have the same coordinate. Inverse distance to power 3 is currently methods that used to extraction blocks grade control. In this paper, by combining extraction and exploration data after using statistical test and after accounting optimum variogram parameters using jackknife kriging and residual analysis, Kriging methods applied to grade control of extraction blocks of 2412.5 bench mark of Sarcheshmeh copper deposits. Estimation variances showed utmost 0.07% in 2412.5 benchmark. At last these two estimators compared with each other and regression between them showed regression between 70 to 85 percent. These results showed that IDW have a satisfied validation in grade control of extraction blocks in Sarcheshmeh copper mine.

Keywords: Inverse distance, kriging, grade control, variography, jackknife kriging, residual analysis.

INTRODUCTION

One of the common problems in the mine utilization is grade differences between extraction and processing sector in mine plant. Because of this reason serious attention in the past two decades has been to focus by mining experts. Considering the importance of this subject and grade differences between mine and mill, adequate grade estimation for mineral processing feed and importance for more precise application of techniques for extraction of mineral blocks as well as palpable. One of the important issues in the utilization of feed grade copper source control is fixed feed grade, which have minimum variance, limits the concentration to provide input feed to the plant [1]. Nowadays controlling of block grade copper extracted is being done by inverse distance method (power 3) [2]. Lack of estimating variance estimation in this model, using kriging as the best unbiased geostatistical estimator of grade and tonnage for each block and provide optimal oscillation grade copper processing factory complex origin seems to be necessary

This type of planning is in connection with the production of short-term (three months to one year). Comparison data from

long-term planning stage, in this step, existing data are more in terms of quality and more reliable. These data include exploration and exploitation grade borehole. By whole drilling, samples within the hole in the center block are out. With proper sampling of these boreholes, samples sent to the laboratory and each sample is analyzed. Drilling depth of the stairs is as deep as extraction bench height of about 12.5 meters. For combining extracted and explored data statistical tests are used. Due to the plurality of extracted data, exploratory data used only when the extracted coordinates is met at least 40 * 40 blocks of each exploratory bores. In this paper utilize data and information have been studied in 2412.5 bench mark and tried achieve fixed block Grade extraction rate fluctuations to the optimal concentration of factory production to be included in planning and the results compare with inverse distance method (to power 3) that currently use in grade control unit of Sarcheshmeh copper mine.