

Stochastic Optimization Taking Account of Seismicity Induced by Block Caving Applied to Underground Copper Mining in Chile

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Resumo/Abstract:

When block caving is used to extract ore in underground mines, the removal of such large volumes of rock causes small earth tremors, which can damage the workings. The faster the mining advances, the more serious is the micro-seismicity and the more expensive it is to provide adequate support to prevent serious damage.

The objective of this research project, which is being sponsored by the state mining company Codelco and tested, using data from El Teniente mine, is

1. To model the relationship between the speed of mining and the induced micro-seismicity
2. To use multistage stochastic programming to optimize the mining, as a function of the copper grade and the copper price taking into account the speed mining-seismic behavior.

The decision variables are the speed at which mining should advance and the proportion of each block to be mined in each time period.