

Development of a Geomechanical Risk Assessment Model for Underground Openings

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Abstract : The main objective of this research project is to delve into a multitude of geomechanical risks associated with various mining methods employed within the underground mining industry. Controlling geotechnical design parameters and operational factors affecting the selection of suitable mining techniques for a given underground mining condition will be considered from a risk assessment point of view. Important geomechanical challenges will be investigated as appropriate and relevant to the commonly used underground mining methods. Given the complicated nature of rock mass in-situ and complicated boundary conditions and operational complexities associated with various underground mining methods, the selection of a safe and economic mining operation is of paramount significance. Rock failure at varying scales within the underground mining openings is always a threat to mining operations and causes human and capital losses worldwide. Geotechnical design is a major design component of all underground mines and basically dominates the safety of an underground mine. With regard to uncertainties that exist in rock characterization prior to mine development, there are always risks associated with inappropriate design as a function of mining conditions and the selected mining method. Uncertainty often results from the inherent variability of rock mass, which in turn is a function of both geological materials and rock mass in-situ conditions. The focus of this research is on developing a methodology which enables a geomechanical risk assessment of given underground mining conditions. The outcome of this research is a geotechnical risk analysis algorithm, which can be used as an aid in selecting the appropriate mining method as a function of mine design parameters (e.g., rock in-situ properties, design method, governing boundary conditions such as in-situ stress and groundwater, etc.).

Keywords : geomechanical risk assessment, rock mechanics, underground mining, rock engineering

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