Investigating the impact of the estimation error of fracture intensity (P-32) on the evaluation of in-situ rock fragmentation and potential of blocks forming around tunnels

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Abstract

The purpose of this work is to highlight the impact of input parameters uncertainty in discrete fracture network (DFN) models and their engineering applications. We show how the error of an input parameter, here the volumetric discontinuity intensity P-32, impacts the DFN model and two important rock mechanics engineering applications: the in-situ fragmentation size distribution and the potential of formation of removable blocks around tunnels, as two key parameters at block cave mining designs. The volumetric discontinuity intensity (P-32) is estimated by two different approaches: the first one estimates P-32 directly from 1D data and it is straightforward to implement, while the second one is based on the simulation of DFN models and needs both 1D and 2D data sets, which makes it less flexible and time consuming. The estimated values of P-32 obtained from the direct approach are found to be more accurate than those by the simulation approach, with significant impacts observed in the constructed discrete fracture network models and in the estimation of the in-situ fragmentation size distribution and potential of formation of removable blocks around tunnels.

Keywords

Author Keywords: Discrete fracture network model; Volumetric discontinuity intensity; In-situ fragmentation size distribution; Kinematic block stability analysis
KeyWords Plus: MONTE-CARLO-SIMULATION; TRACE LENGTH; DIAMETER DISTRIBUTION; MASS; DEFORMATION; MINE; VALIDATION; GEOMETRY; MODEL

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