Estimating Probability of Instability of Haulage Drift with Respect to Mining Sequences

Abdellah, W., Mitri, H. S., Thibodeau, D. and Moreau-Verlaan, L.

Abstract:

Haulage drifts play a vital role in providing personnel and equipment access to ore extraction areas for mine production. Thus, their stability is of crucial importance during the life of a mine plan. Many Canadian mines use longhole mining methods or one of its variants. These methods require access to the orebody through haulage drifts on multiple levels. This paper examines the stability of mine haulage drifts with respect to planned mining sequence. A case study of an underground mine is presented. The case study examines #1 Shear East of the Garson Mine in Sudbury, Ontario. A two-dimensional, elastoplastic, finite difference model (FLAC 2D) is developed for a haulage drift situated 1.5 km below surface in the footwall of the orebody. The stability of the haulage drift is evaluated in terms of the spread of yield zones into the rockmass due to nearby mining activities. The performance of the drift stability is evaluated at various mining stages, employing the Random Monte Carlo technique (RMC) in conjunction with finite difference modelling to study the probability of unsatisfactory performance of the drift. The results are presented and categorized with respect to probability, instability, and mining stage.

Keywords:

Haulage drifts stability, numerical modeling, RMC, yielding zone.

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