Stability Analysis of Vertical and Inclined Backfilled Stope

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Abstract:

Sublevel stoping mining with delayed backfill is a widely employed method in many Canadian underground metal mines (e.g., Bosquet, Doyen, Laronde, and Lapa mines in Quebec and Garson, Creighton, Red lake and David bell mines in Ontario). In this method, the extracted stope(s) must be tightly backfilled before advancing to extract the adjacent secondary stope(s). Thus, backfill is necessary to provide good-confinement to the host rock mass. Therefore, its objective is to maintain the stability of mined out stope(s). Otherwise, the failure of backfill column into adjacent stope(s) leads to higher operation cost (e.g., cost of ore milling/ore processing operation, costs associated with ore dilution when waste/backfill material mixed with unmined block(s)). Consequently, backfill instability could lead to an overall unsafe/interruption mining operation. This article presents the results of numerical modelling analysis to evaluate the performance stability of vertical and inclined backfilled stope adopting stress state distribution. Two-dimensional finite element model is built to conduct linear elastic analysis employing RS2D program (e.g., formerly known as phase2D). The results are presented and discussed in terms of vertical stress and absolute total displacement.

Keywords:

Backfill performance evaluation, Stress state into backfilled stope, Numerical modelling, sublevel stoping mining system

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