DEPARTMENT OF MINING ENGINEERING RESEARCH

Simulation of tabular mine face advance rates using a simplified fracture zone module

This research describes a method to determine the time-dependent stability of the fracture zone near the edges of tabular excavation layouts when different mining rates and face advance increment lengths are scheduled. Some analytic properties of the proposed time-dependent fracture zone evolution model are presented, initially for a simplified mining geometry. The implementation of the model in a general tabular layout setting is described next, including a novel scheme to allow for partially fractured elements. The reef plane stress distribution in the fracture zone is solved using a fast-marching method that is coupled to a displacement discontinuity solution of the excavation and fracture zone deformations. The numerical scheme is illustrated by considering the extraction of a hypothetical deep-level mining layout. The sensitivity of the results to changes in the mining rate schedule and the face advance step size are discussed. Further extensions to the solution scheme are noted.

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