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ANALYTIC SUBSIDENCE MODEL USING VOID-VOLUME
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ABSTRACT

Subsidence is developed within a simple framework that combines the action of several discrete deformational and collapse or failure mechanisms. These mechanisms describe the subsidence parameter, which links subsidence volume to mined volume. The mechanisms are time dependent material responses, save for the time and material independent collapse modes which lead to material bulking. The collapse mode is described by a bulking parameter and a void volume distribution function that depends, in the example described here, upon the details of falling roof blocks. The framework suggests relevant materials data and strata parameters. It also provides for propagation of appreciable amounts of void volume to the surface in a non-elastic manner and, therefore, may circumvent difficulties found in other concepts.

A material response model that uses an elastic-plastic material description and a bulking mechanism was incorporated into the finite element computer program, HONDO. Solutions for a mining sequence simulation are given for extremes of the void-volume distribution function. Subsidence profiles for these solutions are compared to show the influence of the parameters. Although these current solutions use a constant bulking parameter, they illustrate adequately the critical nature of bulking in the subsidence process.

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