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EVALUATION OF OVERBURDEN DAMAGE IN A SALT MINE ENVIRONMENT BY A CONTINUUM-DISCRETE NUMERICAL MODELING APPROACH

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Abstract

With the objective to better understand the evolution of overburden damage on top of an underground solution mining, an in-situ experiment is undertaken above a salt cavity in the Lorraine region (NE of France). The overburden overlying the salt cavity is characterized by a competent layer where most brittle damage, with the associated microseismicity, is expected. This work presents a coupled continuum-discrete modelling approach to simulate the mechanics of fracture initiation and propagation in the rock mass, a continuum approach for the marls and salt layers, and a discrete micromechanical approach for the competent layer. Numerous calibration experiments of the microproperties of the discrete domain are firstly performed by reproducing the macroscopic mechanical response of the competent layer samples. The numerical validation of the coupled approach is achieved by comparing the results from the coupled approach with those from the fully continuum model at the site scale. First modelling results suggest that the fracture mechanisms in the competent layers are predominantly tensile. Moreover, explicit microcracking simulations open interesting perspectives for comparison with the observed microseismicity of the study area.

Key words: Cavern development, Computer modelling, Overburden damage