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CALIBRATION OF ROCK SALT THERMAL AND MECHANICAL PARAMETERS BASED ON AVAILABLE FIELD DATA

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Abstract

Rock Mechanics studies for salt caverns generally consist of performing creep tests at the laboratory, adjusting the parameters of a creep law against tests data and performing numerical computations to predict the long-term behavior of the caverns. There are possible flaws in this method. Results essentially depend on creep tests duration and on the choice of the creep law. This choice is based on the main features observed during tests which, in most cases, are a couple of months long (a two-month duration is typical). During such a period, sample behavior is transient: strain rate decreases rapidly and it is difficult to infer from the strain rate observed at the end of the test what will be the strain rate one year or one decade later – the period of interest when predicting the behavior of a cavern. For this reason, the selection of the mathematical function which fits best the observed strain-vs-time curve is crucial (exponential, logarithm, power law functions …?). All these functions can provide a good fit, provided that the parameters are correctly selected. However, when it comes to extrapolation to long periods of time, these functions will predict very different responses. The objective of this paper is to prove that actual observations performed in real caverns at different time scales (one year and fifteen years after cavern creation) cannot be explained through too simple constitutive laws.

Key words: Cavern Testing, Computer Software, Modeling, Salt Mechanical Properties