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**NUMERICAL COMPUTATIONS OF THE MECHANICAL BEHAVIOR
OF CEMENTED CASINGS SUBMITTED TO LARGE AND FAST
PRESSURE VARIATIONS**

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ABSTRACT

The mechanical behavior of a salt cavern has been studied extensively for many years, but little is known about the behavior of cementations submitted to sharp pressure variations. This problem is of concern for the short-term integrity of hydrocarbon storage facilities and for the long-term integrity of abandoned caverns. Dedicated software has been developed to model fully the geometry of a well, taking into account various constitutive laws for the materials, and to compute the stress fields when the well is submitted to a complex loading history. Elasto-visco-plastic behaviors of cement and salt are taken into account. A pessimistic worst-case accident scenario is considered, and stresses are computed as a function of time to verify that no tensile stresses appear in the cement. A sensibility study is performed that takes uncertainties of material parameters into account.

Keywords: Cement evaluation, Computer modeling, Safety, Mechanical integrity