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THE MECHANICAL STABILITY OF A SALT CAVERN USED FOR COMPRESSED AIR ENERGY STORAGE (CAES)

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Abstract

Compressed Air Energy Storage (CAES) in salt caverns has been successful at two sites for 35 years. This technology remains relevant with the increasing interest in renewable energy, as it represents an interesting option for massive energy storage. The most significant improvement in recent years is most likely the third generation of CAES, or AA-CAES, in which the storage of compressed air is adiabatic, allowing the energy balance to be optimized during operation and increased overall efficiency of the facility. From the perspective of rock mechanics, there are still questions about the structural stability of a cavern under high-frequency loading. Several researchers work in both the experimental and numerical aspects: for experimental aspects, see Arnold et al. (2011), Bauer et al. (2010, 2011), and Fuenkajorn and Phueakphum (2009); for numerical aspects see Staudtmeister and Zapf (2010), Dresen and Lux (2011), Brouard et al. (2007, 2011) and Bérest et al. (2012). This paper presents numerical computations performed to analyze the stability of overhanging blocks, especially during debrining and at an early stage.

Key words: CAES, Overhanging Blocks, Debrining, Air Lift, Numerical Computations, Rock Mechanics