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# CONVERGENCE ESTIMATION FOR GAS STORAGE CAVERNS FIELD

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**Abstract**

The paper presents analyses of the convergence of gas storage caverns field. The caverns are located at different depths which results in different values of minimum and maximum storage pressures and various total storage capacities of each cavern. The convergence of each cavern is described by formulas, which have the same shape as Norton creep law, i.e. power function of pressure difference (primary pressure in rock massif minus gas pressure in the cavern), multiplied the exponential function of temperature.

Coefficients of convergence function were fitted on the basis of parametric study including: the finite elements method calculation for the 8 depth foundations of the cavern (between 750 and 1800 m b.s.) and 10 values of gas storage pressure. The fitted coefficients are different from those describing the stationary creep of salt.

At the current stage of research no interaction between caverns and no influence of cavern geometric volume on its relative convergence is assumed.

Some example of how the storage facility operation should be arranged to assure the minimal total convergence of storage caverns area during the withdrawing and injection processes is presented. Generally, as expected, the caverns located at lowest depth should be empted at first place, in the case of injection the sequence should be opposite. The exceptions from this rule are connected with the maximum withdrawal rate from the individual caverns, which is also included in the developed algorithm.

The presented work is the first part of research program, aimed at developing of an algorithm to control the operation of KPMG Mogilno gas storage facility to ensure a minimization of the total convergence.

**Key words:** Rock Mechanics, Caverns for Gas Storage, Cavern Operation