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Mathematical modeling of the rheology of swelling systems

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Abstract

Consideration is given to a mathematical model of the rheology of swelling systems, the basis for which is provided by generalization of the filtration-consolidation theory to the case where the mass of the solid phase of a porous skeleton changes due to the flow of a fluid during the swelling and shrinkage processes under the action of osmotic pressure. The problem on swelling and shrinkage of a clay layer has been formulated and solved. The features of the model, which are important for explanation of certain characteristic features of the processes in swelling systems, have been investigated based on an analysis of the solution. It has been shown that the solutions obtained are in good agreement with experimental results. © 2005 Springer Science+Business Media, Inc.

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