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Mechanics of time-dependent compaction in accumulating sediments

E. Suetnova (1)

V. Cherniavsky (2)

(1) Institute of Earth physics. R. Ac. Science. Moscow, Russia

(elena@ifz.ru / Fax: 7 495 2526040 Phone: 7 495 2549295)

(2)Moscow State University. Moscow, Russia

(Fax: 7 495 2526040 Phone: 7 495 4208255)

The fundamental understanding of compaction parameters is important in fundamentals and engineering studying of sedimentary regions. Analytical and numerical models of time-dependent compaction process at basin scale allow us to evaluate the effective viscosity of sediment undergone the compaction. The porosity and effective stress evolutions during geological history of porous rock are described by a poro-visco-elastic (Maxwell-type) constitutive law. The set of model calculations for compaction process, in a range of parameters that is representative for porous rocks, show that the rate of compaction process depends on initial porosity of accumulated sediments and grain size and its physical property. Effective viscosity of sediments can be evaluated by the comparison of results of the model calculations and porosity-depth carves and sediment age, derived from experimental data. Our studies show that the most probable value is $5 \cdot 10^{-11}$ Pa$\cdot$ s