

# Mathematical models of the influence of exogenous processes on the stress-deformed state of the continental lithosphere

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In this paper, the degree and structure of the influence of exogenous (erosion and accumulation) factors on the stress state of the continental lithosphere that is formed under the influence of tectonic processes is studied. The study is conducted by the methods of mathematical (analytical, semi-analytical and numerical) modeling. Exogenous processes are introduced both “in isolation” and under conditions of an endogenous active geodynamic process. In the second case, the continental lithosphere of the region of formation of epiplatform orogens is considered, as an endogenous process forming a stress-deformed state together with exogenous ones, forced convection in the lithosphere initiated by thermogravitational convection in the asthenosphere is considered, which is considered as a possible geodynamic process responsible for the formation of an epiplatform orogen Asia (in more detail in [1]). On the basis of this model, two models of accounting for exogenous processes, conventionally called denudation and erosion, are introduced, in turn. The first is traditionally used in geomechanics and is associated with the amplitudes of the terrestrial crust, the second with the shape of the relief. Due to the lack of a current unified idea of a specific way of taking into account erosion and accumulation of geomaterial in mathematical geodynamic models, the question of a possible way of developing such an approach is being considered. The principal differences are shown both in the structure of the stress-strain state and in the level of stresses formed in the models presented.

The paper also presents numerical models of the formation of an anomalous stress state associated with the occurrence of exogenous processes outside the bundle with active endogenous geodynamic processes. For this purpose, elastic-plastic models (similar to those presented in [2]) are used. The mechanism of the formation of anomalous voltages related to the denudation of the substance of the Earth’s crust, which is initially in a supercritical state, is considered [3, 4]. Based on this mechanism, three models are introduced that differ in the localization of areas of denudation: in the first denudation extensive areas of platforms are exposed, in the second denudation they are localized in a slope area, in the third - in the area of a large river bed. The structure of the emerging additional stresses (mainly horizontal compression) is shown in models at different amplitudes of denudation.