SEISMIC OSCILLATIONS IN THE SIMPLE MODELS OF THE EARTHQUAKES

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For modeling of seismic processes the dynamics of tectonic plate motion with Stribeck – effect of friction force is considered. In Khaickin problem of a simple single block system for low velocities the Van der Pol equation of frictional auto-oscillations is obtained. Existence of "stick-slip" dynamics, investigation of which is important for relevance of possible mechanisms of the earthquake processes, is shown. Dynamics of two connected Van der Pol oscillators is considered, in which at presence of external periodic force on the background of low frequency periodic "tectonic" signal the high "seismic" oscillations are revealed. Such signals are obtained due to real seismic signal treatment, which verifies a good agreement of the model with actual seismic observations.

The nonlinear dynamics of one and two-block systems due to different analytical models of dry frictions without velocity restrictions is also studied using numerical methods and possibility of "stick-slip" motion as well as the determined chaos taking into account the Stribeck – effect is shown. In the model regular and chaotic motions are studied by virtue of spectral analysis of obtained signals, bifurcation diagrams and Poincaré section of phase trajectories. Existence of determined chaos in such simple models complicate Earthquake forecasting by seismic signal analyzing, but gives physical scenario of the process.

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