# Damping of coseismic rupture propagation

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Excessive stresses accumulated in the Earth's crust are released, as a rule, during interblock slippage along existing faults and large cracks. It can be realized as slow modes – slow slip events and low-frequency earthquakes, and fast mode – earthquakes. Engineering activity often leads to intensification of seismicity or its occurrence in aseismic areas, for example, in the development of hydrocarbon deposits, mining operations. A small depth of localization of hypocenters of such events can lead to fairly large economic losses. However, high knowledge of rock mass in the development of mineral deposits, makes it possible to make a reasonable choice of fault zones, potentially dangerous from the point of view of the occurrence of large fault-slip bursts.

At present, it is established that the coseismic rupture begins in the fault zone characterized by the property of velocity weakening, at the same time, the damping and stopping areas are characterized by the property of velocity strengthening. The aim of this work is to establish the optimal parameters of the impact on the focal zone, aimed at reducing the energy of the dynamic failure.

In this paper, we investigated the deformation patterns of the 1D slider model in numerical experiments. The model represents a system of blocks elastically connected with each other. Each block moves under the action of elastic forces acting on the side of adjacent blocks and the driver, and friction forces acting along the interface of the model fault. In our calculations we considered a system of 25 blocks. During the experiments, we simulated the external influence in the form of changes in the frictional properties of the interface in certain blocks. In the course of the "impact both the area of change in friction properties and the severity of the property of high-speed hardening were changed.

Experiments have shown that, as a rule, the energy of dynamic rupture decreases with increasing area of change of friction properties. However, there are separate configurations of "impact in which the energy of the dynamic failure is not only saved, but can also increase. This shows the need for a very scrupulous configuration of the effective impact while minimizing the cost of its implementation.

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