



A vibroseismic method for estimation of the ecological risk of powerful technogenic and natural explosions

Marat Khairtdinov (1,2), Gyulnara Voskoboynikova (1,2), and Galina Sedukhina (1)

(1) Institute of Computational Mathematics and Mathematical Geophysics of the Siberian Branch of Russian Academy of Sciences, Geophysical Informatics Laboratory, Novosibirsk, Russian Federation (marat@opg.ssc.ru), (2) Novosibirsk State Technical University

This paper presents the results of experimental investigations of an original ecologically safe approach, proposed by the authors, to assessment of the geoeological risk from powerful mass explosions for the social and natural environment. In this approach, seismic vibrators are used as sources imitating explosions but having, in contrast to them, a much smaller power. Such sources can simultaneously excite in the medium seismic and acoustic (vibro-seismo-acoustic) oscillations with precision power and frequency-time characteristics. A comparative analysis of seismic and acoustic wave levels allows us to conclude that the major ecologically dangerous effect of ground-based test site explosions is due to acoustic waves whose energy is an order of magnitude greater than that of seismic waves. Calculated azimuthal dependencies of the focusing effect of acoustic waves in the infralow frequency range at different wind velocities and “source-receiver” distances by vibrator CV-40 were obtained. It was found that meteorological conditions have a greater influence on acoustic wave focusing in experiments that according to theoretical results. The effects of focusing of acoustic oscillations in space were revealed and estimated quantitatively. Specifically, it was proved that even at a weak wind of 2–4 m/s the ratio between the maximal and minimal acoustic wave levels depending on the azimuthal direction can reach 50. This can be a reason for great ecological hazard of technogenic explosions. The received results are new and original. The received results are new and original.