



Improving the efficiency of seismic vibrators for global sensing of the Earth

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Global sensing of the Earth using controlled active vibration sources is a complex and ambitious task. The technical means existing today can hardly cope with it. Therefore, in addition to increasing the absolute power of these emitters, it is necessary to increase their efficiency.

It is known that about 70% of the radiation energy of seismic vibrators is emitted in the form of surface waves, which is useful for many geophysical tasks, especially in engineering studies. However, for global sensing of the Earth this seems irrational, since in this case it is necessary to use body waves. A tempting idea is the redistribution of energy emitted by a seismic vibrator between surface and bulk waves.

This can be implemented using seismic barriers. Initially, such structures were used to protect important infrastructure to protect them from the damaging effects of surface waves caused by earthquakes. However, the shielding effect can be used in the opposite way - instead of preventing the penetration of surface waves into the protected area, it is possible to limit its radiation outside this area by a seismic vibrator located inside it. So it is possible to improve the efficiency of seismic vibrators.

In the present study, various configurations of seismic barriers with different parameters were investigated using numerical modeling. It is shown that there are configurations implemented in practice that can significantly improve the efficiency of the emission of bulk waves by seismic vibrators due to the almost complete scattering of surface waves.

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