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Results of numerical simulation of the surface waves scattering on local inhomogeneities

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Today, many methods of passive seismic exploration based on the use of surface waves show impressive results. These technologies are relatively young and continuously improved. Nevertheless, the physical principles underlying these methods are still emitted relatively weak due to the complexity of this task. Therefore, the purpose of this study was to identify patterns of interaction of probing signals with a heterogeneous geophysical environment.

A thorough numerical two-dimensional and three-dimensional modeling of the scattering of surface waves of the Rayleigh and Stoneley type on buried inhomogeneities of various densities, elastic characteristics and shape was carried out. The cumulative effect of physical inhomogeneity, represented by local contrasting inclusions and geometric, associated with non-planar relief of the surface of the study area was considered. Both the amplitude characteristics of the surface waves and the dispersion characteristics were subjected to analysis.

It is determined that the relief of the medium affects the surface waves commensurate with the influence of local inclusions. These effects are manifested both in the change in the energy characteristics and in the anomalous change in the velocity of propagation of these waves in the case of convex relief.

The laws of scattering of surface waves on local inclusions are revealed. The ways of improving modern passive methods of deep sounding are proposed both by introducing additional corrections for the relief, and by using the layer-by-layer accounting procedure for the heterogeneity of the geophysical environment.

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