



Topographic influence on the results of passive monitoring of geophysical structures

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Today, methods using surface waves are becoming more widely used. Particularly promising are the passive technologies of surface wave tomography and methods that analyze the amplitude characteristics of surface waves.

These technologies are continuously being improved, but the issues of taking into account the influence of the relief have not yet been given due attention. The fact is that analytical approaches, due to the complexity of the task, for the most part allow to obtain solutions only for frequencies and landforms, which are poorly applicable in real problems of geophysics. Numerical and physical modeling requires either high-performance computing systems that are just starting to be available, or expensive precision measuring equipment.

Thus, due to the need and lack of acceptable solutions for the scattering of surface waves on the features of the relief required for geophysical tasks, this study is relevant, and the results obtained are new.

One of the result of the study was the creation of universal numerical models that allow to investigate the propagation of surface waves in 2d and 3d formulations. The correctness of these models is confirmed by comparison with the results of laboratory experiments. A thorough study of the scattering of surface waves on the features of the relief of different shapes and sizes, including the seabed and layered media, has been carried out. It is shown that, under certain parameters, the influence of the relief can change the intensity of a surface wave by an order of magnitude and in some cases change the field structure more strongly than local inhomogeneities; therefore, it must be taken into account in geophysical studies. These effects are especially pronounced for the horizontal components of surface waves in the case of a curved boundary between a liquid and a solid. A comparison of field research data with the obtained numerical results was made.

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