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ON ACOUSTIC WAVEFIELD FOCUSING NEAR A SLOPING BOTTOM IN A SHALLOW-WATER WAVEGUIDE

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The problem of sound propagation along the coastal wedge in a shallow sea is considered. Attention is concentrated on the acoustic mudslide effect that is accompanied by enhanced sound focusing near the bottom and insonification of the underwater acoustic channel axis as an acoustic beam enters into a deep sea. The present work studies influence of the sound-speed profile on the efficiency of the focusing. Degree of focusing is measured using the Husimi function being a particular case of the smoothed Wigner function and allowing one to map an acoustic wavefield onto phase space of ray equations. Using the Husimi function, we can estimate simultaneously depth focusing and narrowing of the angular wavefield spectrum. It is shown that increasing of the thermocline depth results in decreasing of focusing degree. This circumstance is related to narrowing of the near-bottom sound channel. Efficiency of focusing decreases with increasing sound wavelength, that indicates on the ray-based origin of the mudslide effect. A model of an acoustic waveguide in the Sea of Japan is considered as an example.

Keywords: shallow sea acoustics, shallow water waveguide, acoustic mudslide effect.

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