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MODEL DESCRIPTION AND EXPERIMENTAL RESEARCH OF SOUNDFIELDS IN THE INFRASONIC RANGE IN A SHALLOW SEA (Review)

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The paper presents a classification of the known solutions of the Pekeris boundary value problem obtained in various model formulations and their comparative assessment. Special attention has been given to the substantiation of a non-self-adjoint model setting. In it, the eigenfunctions of two conjugate operators take part in the description of the total sound field. These eigenfunctions are both diverging waves and converging recoil waves connected by the transformation mechanism on the transformation horizons. In this model formulation, all normal waves captured by the waveguide are excited by conjugate pairs at longitudinal resonance frequencies, which are multiple roots of the dispersion equation. In each pair of waves, one wave is a regular wave, diverging over the entire domain of definition. Another wave is generalized (hybrid), as it contains a transformation horizon in a half-space (a horizon of total internal reflection according to Newton), where the diverging wave is transformed into a converging recoil wave. It is noted that the greatest difference in model solutions occurs at frequencies of the infrasonic range. Various model solutions were verified through an experimental study of the sound field in a shallow sea in the sound frequency range and the infrasonic frequency range of 2-20 Hz, which is obviously lower than the first critical frequency of the Pekeris model waveguide. The use of combined receivers in the experiment made it possible to verify normal waves taking into account their group velocities and the features of the energy structure of the sound field, which is most sensitive to the choice of the model description.

Key words: combined receiver, infrasound, generalized (hybrid) waves, group velocity.

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