Structured Session: ***Sound field fluctuations in underwater variable environment***

Modal Structure of the Sound Field in a Shallow-Water Waveguide with a Sediment Layer

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The paper considers low-frequency sound propagation in the three-layer model of the shallow water waveguide, where a thin layer of gas- saturated sediment is situated between a homogeneous fluid sub-bottom and a continuously stratified water column. Typical values of the thickness and sound speed in the gassy layer are1m and 250 m/s. The layer is thin compared to typical water depth of about 40 m. Normal mode structure of the acoustic field is analyzed. It is shown that with increasing frequency each normal mode transforms into a mode trapped in the gassy layer. These modes have unusually small phase and group speeds that are significantly less than the sound speed in water. Theoretically predicted normal mode dispersion curves are compared to the dispersion curves retrieved from observations of shipping noise. Phase speeds of normal modes are measured by cross-correlating the noise recorded on two sparse vertical arrays. A technique is proposed for solving the inverse problem of determining the parameters of a gas-saturated layer by matching the measured and modeled frequency dependencies of the normal mode phase speed.

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