Abstract View

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Spectral Characteristics of Small-Scale Fluctuations of Hydrophysical Fields in the Upper Layer of the Ocean

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ABSTRACT

In the P.P. Shirshov Institute of Oceanology of the USSR Academy of Sciences, instrumentation has been developed for the measurement of the fluctuations of the hydrophysical fields in the ocean in the frequency band from a fraction to a few hundred hertz under conditions of towing as well as sounding on station. Research was conducted on a number of the polygons in the Atlantic, Pacific and Indian Oceans with typical hydrometeorological conditions. A set of the statistical characteristics of the micropulsations of the hydrophysical fields in the ocean is calculated, including the spectral densities $E_1(k)$, where k is the wavenumber. The level of the spectral densities $E_1(k)$ and their slope (in logarithmic coordinated) are rather variable. For single cases the functions $E_1(k)$ could be approximated by the $k^{-5/3;}$ law of locally isotropic turbulence. In the small-scale part of the spectrum, a quick decrease of the values $E_1(k)$ is often observed, evidently caused by the influence of molecular viscosity (or thermal conductivity). In some cases the spectral curves have a shape typical of non-developed turbulence at comparably small values of the Reynolds numbers (10^4–10^5).In a number of cases, however, over the range of k studied the spectral densities of the current velocity pulsations have a steeper slope than −5/3 which might be explained by the influence of the buoyancy force on the turbulent structure.