Sukhinov A. I., Protsenko S. V. (Rostov-on-Don, Russia). **Building of turbulent exchange model for coastal systems on the basis of expedition data statistical analysis.**

The frequency intervals of turbulent fluctuations and surface and internal waves overlap to a large extent, so that in the frequency range common to turbulence and waves, in order to assess the characteristics of turbulence as such (defined as a part of natural fluctuations incoherent with waves, not only the above-mentioned mechanical and electrical noises, but also fluctuations, must be filtered out from the recording of ADCP readings, created by waves. It is possible to filter out fluctuations created by surface waves if synchronously with complete natural fluctuations of the sea surface level (or pressure fluctuations at some depth). The hydrophysical ADCP probe Workhorse Sentinel 600 was used to measure the three-dimensional velocity vector of the water medium. The problems of decomposition of series of empirical data obtained using ADCP into an evolutionary component and cyclic components belong to the class of inverse problems of processing and interpretation of experimental data. Correction is a special case of a more general decomposition problem, when a cyclic component with a period of regular excitement is allocated. The remaining component is called the adjusted series.

In inverse problems, the observed value is the initial series of instantaneous velocity pulsations, i.e. the result of addition (multiplication, for multiplicative models) adjusted series and cyclic component. In other words, the consequence is known – the result of addition, and it is required to determine the causes – individual terms. For wave fluctuations of the indicator, the same consequence can be caused by completely different, moreover, even opposite reasons.

Waveform recording of sea surface deviations as a function of time makes it possible to determine a number of statistical characteristics: mean, variance, standard deviation, etc. One of the main statistical characteristics of the wave is the standard deviation of the sea surface σ_η, determined by the ratio

$$\sigma_\eta = \bar{\eta}_0^2 = \frac{1}{T_L}\int_0^{T_L} \eta_0^2 dt,$$

where η_0 is the deviation relative to the mean sea level in a short time interval, T_L is the full length of the record. For a group of simple harmonic waves with amplitude a, the standard deviation is equal to $\sigma_\eta = \bar{\eta}_0^2 = \frac{a^2}{2}$. For a superposition of a large number of simple harmonic waves with a random phase $\sigma_\eta = \frac{1}{2}\sum_{n=L}^{\infty} a_n^2$. The wave energy per unit area is equal to $E = \frac{g\rho}{2}\sum_{n=L}^{\infty} a_n^2 = g\rho\sigma_\eta$. The study of waves ultimately boils down to the identification of statistical patterns, which are numerically expressed by the dependencies between the elements of waves and their determining factors.

Comment. Based on the processing of data obtained using the ADCP probe, it was revealed that the characteristic length of a regular wave for the Azov Sea is 15-25 meters, and the characteristic speed is 0.1 – 0.2 m/s, the maximum is 0.51 – 0.77 m/s. The data obtained by modeling are consistent with the data provided by the Unified State System of Information on the Situation in the World Ocean.

REFERENCES

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