

INTENSITY AND PROBABILITY-RELATED PROPERTIES OF TURBULENCE OF STEADY RIVER FLOWS

The article represents an overview of the field studies of the intensity and distribution of probability of longitudinal turbulent velocity fluctuations in river flows with different sizes of beds and hydrological characteristics. The authors demonstrate that the normalizing transformation of velocity fluctuations performed by the local friction velocity makes it possible to get the changes of velocity fluctuations deep inside the flow close to universal.

The authors have also identified that the intensity of turbulent velocity fluctuations exceeds the friction velocity 2.5—3-fold in the area close to the river bottom, while their intensities demonstrate their gradual decline closer to the surface of the flow. The authors have derived an approximation formula, describing the change of the intensity of longitudinal velocity fluctuations deep inside river flows.

Probability distributions of longitudinal velocity fluctuations were compared to those based on the law of Gauss. It is proven that they have a kurtosis of a frequency curve as well as an asymmetry in comparison with the distribution of Gauss, which are most vivid in the area close to the bottom of the flow. Due to the fact that the coefficient of asymmetry includes a third degree of velocity fluctuations, and a kurtosis of the frequency curve, experimental identification of these characteristics is problematic for the reason of their instability. The new information concerning the intensity and probability properties of the river flow turbulence can be used in projecting the mixture formation and mass exchange processes ongoing inside river flows.

Key words: river flows, turbulence, longitudinal velocity fluctuation, distributions of probability velocity fluctuation, asymmetry.

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