

Intermittency is the main feature of turbulence that differs from the random field. Intermittency is also the most important multi-scale property of turbulence. In inertial range, turbulent intermittency shows the nonlinear scaling exponents of velocity structure functions. The correlation between the intermittency and the flow structures is the hot-spot of turbulence research.

Vortex structure is the main structure of turbulence, but direct search for turbulent flow field in the vortex is not easy. Oscillation of turbulence structure can be observed directly from the turbulence data structure. In this paper, based on the local zero crossing method, turbulent flow field of the groove center are classified into different oscillation structures, and we measured the probability distribution and the statistic momentum of oscillation structure at different scales. The scaling laws of velocity structure functions are calculated in each oscillation on the class. The probability distribution of each oscillation structure class exhibits scale-invariant property, the intermittency of flow field is determined by the strongest intermittent structure. The strongest intermittent structure in the center of turbulent channel flow are C1 class and the C3 type ($p = 4$ and 6), which differs from the case of isotropic homogeneous turbulence.