

The Different Types of Turbulence in Rotating Spherical Layers

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Turbulent flows of a viscous incompressible fluid in a layer between rotating concentric spheres under the action of the modulation of the velocity of one of the spheres have been studied experimentally and numerically. The form of spectra of turbulent pulsations of the azimuthal velocity depends on the sphere whose rotational velocity is modulated, as well as on the amplitude and frequency of modulation. The possibility of the formation of turbulence with spectra qualitatively similar to spectra obtained in measurements in the upper atmosphere is established: with the slope close to -3 at low frequencies and close to $-5/3$ at high frequencies and with the negative longitudinal velocity structure function of the third order. It has been shown that such spectra are formed in the regions of a flow that are strongly synchronized under the action of the modulation of the rotational velocity.

