Inertial waves in the channel turbulence with system rotation[1]
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— We study inertial waves (IWs) in the turbulent channel flow with system rotation about an axis in either streamwise or spanwise direction (STR or SPR). For the mean channel shear flow, we construct IW solutions by the helical wave functions (eigenfunctions of the curl operator), and show their existence when the basic flow satisfies certain conditions. These theoretical predictions were tested by DNS of the rotating channel flows. We have recently confirmed that the STR channel holds IWs when the rotating rate is high enough, and for different rotating rates the IWs have similar wavenumber and negative polarity (JFM, to appear). As for the SPR cases, the IWs may exist at even higher rotating rates than that needed for STR cases. They locate at the layer where the mean streamwise velocity is largest. It is likely that when a system rotation is applied to a unidirectional shear flow, the IWs may appear at the region where the mean streamwise velocity takes the local maximum. The profiles of the mean velocity are modified by IWs.

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