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**Effects of Taylor-Grtler vortices on turbulent flows in a spanwise-rotating channel**[1] YIJUN DAI, WEIXI HUANG, CHUNXIAO XU, Tsinghua Univ — Fully developed turbulent channel flow with spanwise rotation has been studied by direct numerical simulation at $Re_m$ =2800, 7000 and 20000 with rotation number $0 \leq Ro_m \leq 0.5$. The width of the computational box is adjusted for each case to contain two pairs of Taylor-Grtler (TG) vortices. Under a low rotation rate, the turbulent vortical structures are strongly affected by the TG vortices. A conditional average method is employed to investigate the effects. In the upwash region where the fluid is pumped away from the pressure wall by the TG vortices, turbulence is enhanced, while the reverse is the case in the downwash region. Through budget analysis of the transport equation of vorticity fluctuation, it is revealed that the stretching along the wall-normal direction caused by the TG vortices plays an important role in initiating the difference of turbulence intensity between the two regions, which is further augmented by the Coriolis force in the streamwise direction. The effects of TG vortices is weakened at higher Reynolds number. Meanwhile, the shear stress on the suction wall is observed to fluctuate in a quasi-periodic manner at $Re_m$ =7000 and $Ro_m$ =0.3, which is induced by the TG vortices.

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