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On the dynamics and scales of Taylor-Görtler vortices in a channel subjected to high-speed streamwise system rotations BING-CHEN WANG, University of Manitoba, ZIXUAN YANG, Univ of Minnesota - Twin Cities — Direct numerical simulations (DNS) are performed to investigate the dynamics and precise scales of Taylor-Görtler-like (TG) vortices in a streamwise-rotating turbulent channel flow at moderate and high streamwise rotation numbers (up to $Ro = 150$). The highest rotation number tested in the current research far exceeds that reported in the existing literature ($Ro = 30$). In order to capture the TG vortices in the streamwise and spanwise directions, the streamwise domain size is stretched drastically to $512\pi h$, where h is one-half the channel height. A two-layer pattern of TG vortices is identified, and the characteristic length scales of TG vortices are quantified using the pre-multiplied two-dimensional energy spectra. The effects of streamwise system rotation on the scales and dynamics of TG vortices are investigated by comparing the statistical results of rotating and non-rotating channel flows, and through the analysis of pre-multiplied energy spectra and budget balance of turbulent stresses.

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