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Laminarization mechanisms in rotating channel flow STEFAN WALLIN, OLOF GRUNDESTAM, ARNE V. JOHANSSON, Linne FLOW Centre, Dept of Mechanics, KTH, SE-10044 Stockholm — The influence of moderate rotation rate on turbulent channel flow is that the turbulence is suppressed on the stable side and augmented on the unstable side because of the Coriolis force. When the rotation increases the turbulent region becomes restricted to an increasingly thin zone near the unstable wall. For a rotation rate, $Ro > 3$ (normalized by bulk velocity and channel height) inviscid linear theory yields a stable laminar flow (Bradshaw JFM 1969) and a recent DNS study (Grundestam et al., JFM 2008) indicates that the turbulent flow laminarizes for Ro slightly below 3. By including viscous effects in a novel linear stability analysis the critical Ro has been identified for different Re and has been verified by DNS. The most unstable modes are tilted slightly oblique streamwise vortices clearly visible in the DNS. TS waves are unaffected by rotation and are always unstable for supercritical Re but with a different length scale and an interesting interaction with the other modes.

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