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Stability of small divergent channel with wall slip A. SAMEEN, International Center for Theoretical Physics, KIRTI SAHU, Dept. of Chemical Engg., Imperial College, UK, RAMA GOVINDARAJAN, Engg., Mech., Unit, JNCASR, Bangalore — From a non-parallel linear analysis and a transient/ algebraic growth study, we investigate the instability of channel flow subject to two conditions frequently encountered at small scales, local wall divergences and wall slip. The two are known to have opposing effects: slip at the walls has been found recently to strongly stabilizes the linear mode, while wall divergence hugely destabilizes them. At large scales, linear instability is considered relatively unimportant in transition to turbulence, since the latter usually occurs at a much lower Reynolds number, either directly nonlinearly, or triggered initially by transient algebraic growth. We predict a bigger role for linear instability in small-scale flows. As the angle of divergence increases, the effect of slip progressively reverses, from being hugely stabilising to mildly destabilising. The transient growth of disturbances depends only on the Reynolds number and not on the wall slope. The mechanisms and scalings will be discussed at the meeting.

Prefer Oral Session
 Prefer Poster Session

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