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Energy thresholds in the asymptotic suction boundary layer ORI LEVIN, KTH Mechanics, NIKLAS DAVIDSSON, LTU, DAN HENNINGSON, KTH Mechanics — Energy thresholds for transition to turbulence in the asymptotic suction boundary layer are calculated by means of temporal direct numerical simulations. Three well known transition scenarios are investigated: oblique transition, the growth and breakdown of streaks triggered by streamwise vortices, and the development of random noise. Linear disturbance simulations and stability diagnostics are performed for a base flow consisting of the asymptotic suction boundary layer and a streak to investigate the most amplified streamwise wavenumber of the secondary instability. The scenarios are found to trigger transition by similar mechanisms as obtained for other flows. Transition at the lowest initial energy is provided by the oblique wave scenario for the considered Reynolds numbers Re = 500, 800 and 1200. The Reynolds number dependence on the energy thresholds are determined for each scenario. The threshold scales like $\mathrm{Re}^{-2.6}$ for oblique transition and like $\mathrm{Re}^{-2.1}$ for transition initiated by streamwise vortices and random noise, indicating that oblique transition has the lowest energy threshold also for larger Reynolds numbers.

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