Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Transitional regime and laminarturbulent coexistence in the asymptotic suction boundary layer TARAS KHAPKO, PHILIPP SCHLATTER, Linn FLOW Centre, KTH Mechanics, YOHANN DUGUET, LIMSI-CNRS, UPR 3251, Campus Universitaire d'Orsay, DAN HENNINGSON, Linn FLOW Centre, KTH Mechanics — We study numerically the asymptotic suction boundary layer (ASBL) in the transitional regime on the verge of laminarization. Starting from a turbulent state the Reynolds number Re is decreased in small steps until the laminar state is established. This study protocol allows not only to investigate the regime at the onset of turbulence, but also to identify the critical Reynolds number $Re_g \approx 270$, below which turbulence is not sustained. In other planar shear flows the transitional regime at the onset takes the form of stable laminar-turbulent bands, however in ASBL no regime of sustained laminar-turbulent coexistence has been identified. The flow stays fully turbulent even at the lowest Re before laminarization. During the laminarization process streamwise turbulent and laminar avenues are created with no oblique interfaces between the two. This behavior is connected with the existence of a large-scale vertical transport, the feature that distinguishes ASBL from the other wall-bounded shear flows. After an artificial forcing is added canceling all spanwise and wall-normal fluctuations above $y^+ = 100$, transient oblique bands are observed similar to the ones in other subcritical shear flows, while the flow later laminarizes or becomes fully turbulent again.

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Date submitted: 27 Jul 2015 Electronic form version 1.4