

Abstract Submitted
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Delay in transition in a plane channel flow using a wind tunnel with large contraction RAGHURAM SRINIVASAN, O.N. RAMESH, Indian Institute of Science — Measurements were conducted for various friction Reynolds numbers (Re_τ) ranging from laminar through transition to turbulence in a plane channel. The flow was established using a wind tunnel of dimensions much larger than that of the channel, and using two nozzles with contraction ratios of 8.3 and 13 respectively, separated by a settling chamber. Skin friction was determined using friction velocity obtained from wall pressure measurements using a micromanometer and mean velocity from Pitot measurement of the velocity profile. The flow was found to be laminar till $Re_\tau = 70$, much higher than the usual value of 45, which is observed to the start of transition from various other experiments and direct numerical simulation (DNS). Also, the flow attained the state of fully developed turbulence at $Re_\tau = 175$, again much higher than the usual value of 70 observed by others. This delay in transition and turbulence is attributed to having a large effective contraction of around 108, that is expected to have largely reduced the non-uniformities in the flow, hence reducing the stress and skin friction.

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