

Abstract Submitted
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On the influence of free-stream turbulence length scales on boundary-layer transition JENS FRANSSON, SHAHAB SHAHINFAR, KTH - Royal Institute of Technology — A measurement campaign on the free-stream turbulence (FST) induced boundary layer transition has been carried out in the Minimum-Turbulence-Level wind tunnel at KTH. Previous numerical investigations where the turbulence intensity (Tu) has been kept constant, while the integral length scale (Λ_x) has been varied, have shown that the transition location is advanced for increasing Λ_x . The present measurement campaign has been carried out using hot-wire anemometry and consists of 42 unique FST conditions with thorough measurements throughout the transitional region. Unlike other extensive FST induced transition measurements the free-stream velocity was here kept constant for all cases, implying that the boundary layer scale is locked up to transition onset. Our measurements confirm previous results on the advancement of the transition location with increasing Λ_x for low to moderate Tu levels, but show the *opposite effect* for higher levels, i.e. a delay in the transition location for larger Λ_x , which to the knowledge of the present authors so far is unreported. In addition, the common belief that the FST length scales have a negligible effect on the transition location with regards to the Tu level does not seem to be fully true.

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