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The structure of the sink flow turbulent boundary layer O.N. RAMESH, S. MANISEKARAN, DIXIT SHIVSAI AJIT, Department of Aerospace Engineering, Indian Institute of Science, Bangalore-560012 — It is well known that the two-dimensional sink flow turbulent boundary layer is the only smooth wall flow configuration that satisfies the requirements of equilibrium (in the sense of Townsend (1956) and Rotta (1962)). Previous studies in the literature have looked in great detail the evolution of integral and turbulence quantities. The present experimental study is aimed at studying the structure of the sink flow turbulent boundary layer and more specifically with a view to understand the connection between equilibrium and the interaction between inner and outer regions. The sink flow studied has an acceleration parameter of $K = 1.38E-6$. Hotwire anemometry has been used for measurements. Mean velocity and longitudinal turbulence intensities were measured at 11 streamwise stations. It is observed that the mean velocity approaches equilibrium upstream of turbulence intensity. Coles wake parameter was seen to be equal to zero in the region of equilibrium. Higher order moments of streamwise velocity fluctuations are also presented for the sink flow. In the inner region there are some similarities in the skewness and flatness distributions between the sink flow and a zero pressure gradient turbulent boundary layer, whereas in the outer region they are very different. We seek to link the observed differences of higher order moments in the outer region to the structural differences between these two flows.

O.N. Ramesh
Department of Aerospace Engineering,
Indian Institute of Science, Bangalore-560012

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