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Investigation and Control of the Lateral Expansion of Turbulent Region in a Flat Plate Boundary Layer AYUMU INASAWA, Tokyo Metropolitan University, SEIICHIRO IZAWA, YU FUKUNISHI, Tohoku University — A spanwise interface between laminar and turbulent regions is investigated and an attempt to control the vortical structure is carried out in a wind-tunnel experiment. The laminar-turbulent interface is monitored by a rake of single hotwire probes and the vortical structure at the interface is captured by two types of X-type probes using a conditional sampling and ensemble-averaging technique. The tendency that the turbulent region sticks out into the laminar region at the middle height of the boundary layer is found. A pair of longitudinal vortices aligned in the wall-normal direction is found to be the key structure at the interface. It is found that the vortex pair pushes the turbulent fluid into the laminar region, which contributes to the expansion of the turbulent region. It is also shown that the vortical structure can be weakened using a thin vertical plate inside the boundary layer, which results in a suppression of the lateral expansion of the turbulent region.

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