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Using a wall-normal jet to modify the large-scale structures in a turbulent boundary layer MURALI KRISHNA TALLURU, BRETT BISHOP, NICHOLAS HUTCHINS, CHRIS MANZIE, IVAN MARUSIC, The University of Melbourne, THE UNIVERSITY OF MELBOURNE TEAM — We report on attempts to use a wall-normal jet to modify the large-scale structures ("super structures") that are known to populate the logarithmic regions of high Reynolds number turbulent boundary layers. An upstream spanwise array of surface mounted shear-stress sensors detects the passage of the large-scale events. A rectangular wall-normal jet, located downstream of this array targets the identified event and a second spanwise array downstream of the jet monitors any alterations to the large-scale structure. A traversing hot wire probe is mounted above the downstream array to look for modifications across the depth of the boundary layer. As a first step, an off-line control strategy is investigated. In this case, there is no active controller, the jet is periodically fired with fixed parameters and during post-processing, the "control" strategy is emulated in a conditional sense to understand the interactions of an actuated jet with the larger turbulent structures. The results from off-line control scheme are used to develop a real-time control scheme to systematically target the large-scale high skin friction events. The outcome of this control approach on both the instantaneous coherent structures and also the time-averaged quantities is investigated.

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