

Abstract Submitted
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A comparison of objective momentum transport barriers and uniform momentum zone interfaces NIKOLAS AKSAMIT, GEORGE HALLER, ETH Zrich — Uniform momentum zones (UMZs) have become a prominent avenue with which to investigate and explain fluid behavior in turbulent boundary layers. Definitions of UMZs have, however, relied on non-material observer-dependent characterizations of one-dimensional momentum projections that are dependent on the size and resolution of the measurement domain, as well as the choice of statistical methods employed. This research harnesses recent mathematically-proven definitions of momentum-flux-minimizing surfaces to identify three-dimensional momentum transport barriers in turbulent boundary layer flows. Our definition has the unique advantages of being frame-invariant, based on physics, and is not sensitive to UMZ definition ambiguities. A comparison of these momentum-transport limiting structures, common frame-dependent vortices, and UMZ interfaces has been evaluated for these flows. The organization of boundary layer turbulence via objective momentum transport barriers shows great promise.

Nikolas Aksamit
ETH Zrich

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