

Abstract Submitted
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Temporal evolution and statistical characteristics of uniform momentum zones using data-informed resolvent hierarchies¹ ANGELIKI LASKARI, BEVERLEY MCKEON, California Institute of Technology — Experimental data from time-resolved planar particle image velocimetry in streamwise-wall-normal planes of a turbulent boundary layer are used for the determination of temporal evolution and statistical characteristics of uniform momentum zones. Specifically, the temporal variation of both the probability density function (pdf) of the streamwise velocity and the instantaneous number of zones is assessed. Statistically important patterns observed in the experimental data are then used to guide the selection of modes on a self-similar resolvent hierarchy. Although the full range observed for the instantaneous number of zones is not recovered with the use of this restricted number of modes, it is shown that the largest variation observed is due to the modes located in the middle of the logarithmic region. Additionally, results indicate that a single resolvent hierarchy can reproduce a prominent semi-periodic behaviour observed in the experimentally constructed temporal pdf of the streamwise velocity. It is further shown that this behaviour is directly related to the wavenumber of the modes closest to the edge of the logarithmic region.

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