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Statistics and scaling of turbulence in a spatially developing shear layer ANTONIO ATTILI, FABRIZIO BISETTI, King Abdullah University of Science and Technology — A direct numerical simulation of a turbulent mixing layer has been performed. The flow achieves a Reynolds number based on Taylor's microscale equal to 250. The flow originates from a laminar, hyperbolic tangent inlet profile, which is perturbed with white noise. The turbulence statistics in the self-similar state agree with a number of previous results, where the flow evolves from turbulent inlets. Our data suggests that the final state of the layer could be universal. The degree of convergence to high Reynolds number asymptotic behavior has been evaluated by analyzing spectra and second order structure functions. The scaling exponents of high order structure functions are calculated using the Extended Self-Similarity. Over a wide range of scales, the exponents are found to match those in homogeneous isotropic turbulence. However, an additional scaling range is found at larger scales, where the effects of mean shear and coherent large structures are not negligible. The values of the exponents recovered in this second range agree well with those in flows with strong shear (boundary layers, channels and wakes).

Antonio Attili
King Abdullah University of Science and Technology

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