Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Dissipation events in wall turbulence M. J. PHILIPP HACK, Center for Turbulence Research, Stanford University, OLIVER T. SCHMIDT, University of California San Diego — The intermittent nature of turbulent flows is characterized by periods of low intensity that are interrupted by brief extreme events during which quantities such as production or dissipation of fluctuation kinetic energy develop marked peaks. Our study examines the mechanisms of extreme dissipation events in turbulent boundary layers at moderate Reynolds numbers. Conditional sampling is applied to time-series data generated in direct numerical simulations. The results point to a connection between localized dissipation maxima and the formation of hairpin vortices via exponential instability. Specifically, time-resolved conditionally averaged velocity fields at a dissipation event show the characteristic spatial structure of an instability of varicose type, as predicted in linear analyses (*M.J.P. Hack & P. Moin, J. Fluid Mech., vol. 844, 2018*). Visualizations of vortex-identification criteria recover a hairpin-type structure which coincides with the region of highest dissipation. The analysis identifies the precursors of the dissipation events as perturbations in the streamwise velocity component which give rise to the varicose instability by locally augmenting the shear.

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Date submitted: 01 Aug 2019 Electronic form version 1.4