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Tomographic Particle-Image Velocimetry To Investigate Dissipation Elements LISA SCHAEFER, Institute of Aerodynamics, RWTH Aachen University, UWE DIERKSHEIDE, LaVision GmbH, WOLFGANG SCHROEDER, Institute of Aerodynamics, RWTH Aachen University — A new method to describe the nature of turbulence has been proposed by Wang and Peters (JFM 2006). Based on fluctuating scalar fields, local minimum and maximum points are determined via gradient trajectories starting from every grid point in the direction of the steepest ascending and descending gradients. Then, so-called dissipation elements are indentified as the region of all the grid points the trajectories of which share the same pair of minimum and maximum points. The statistical properties of these space-filling elements are evaluated focusing on the linear distance and the scalar difference between their extrema. The procedure is also applied to various DNS fields using u', v', w', and k' as scalar fields (Wang and Peters JFM 2008). In this spirit, dissipation elements are derived from experimental 3D velocity data of a fully developed turbulent channel flow gained by Tomographic Particle-Image Velocimetry. The statistical results, inter alia, regarding the distribution of the element length are compared to those from the DNS.

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