

Abstract Submitted  
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**On the angle between relative velocity and relative acceleration between two fluid particles in turbulence**<sup>1</sup> HAITAO XU, MPI Dynamics & Self-Organization, Goettingen, Germany, ALAIN PUMIR, ENS-Lyon, Lyon, France, EBERHARD BODENSCHATZ, MPI Dynamics & Self-Organization, Goettingen, Germany — In turbulence study, it is often desirable to know if locally the flow is strain-dominated or vorticity-dominated. This information not only is related to the local flow topology, it also reveals where small particles with weak inertia accumulate. However, to determine whether strain or vorticity is dominating requires access to the velocity gradient tensor, which is difficult to measure experimentally. By using results from direct numerical simulation of fully developed turbulence we show that the angle between the relative velocity and the relative acceleration between two fluid particles can be used as an indicator of strain-dominated versus vorticity-dominated flow structure. This new indicator has the advantage that it is much more easily accessible experimentally than measuring the velocity gradients. We also present further turbulence statistics from both DNS and experiments conditioned on the angle between relative velocity and relative acceleration and compare them with those conditioned on strain and vorticity.

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