

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Rotation rate of rods in turbulent flow SHIMA PARSA, GREG VOTH, Wesleyan University — We present the first time resolved experimental measurements of the motion of small rod-like particles in turbulent flow. The orientation and position of rods are measured using Lagrangian particle tracking with images from multiple high speed cameras in a flow between two oscillating grids. We work at low particle density so rod-rod interaction can be ignored. The probability distribution of the rotation rate of the rods has extended tails indicating the presence of rare events with large rotation rate. Rods rotation rate is determined by the velocity gradients of the flow, so measurements of the rotation rate provide indirect access to statistics of the velocity gradient of the flow as well as the energy dissipation rate. However, tracer rods preferentially sample the flow since their orientation becomes correlated with the local axes of the velocity gradient tensor. The result is that the typical rotation rate of rods is much smaller than it would be if they were randomly oriented.

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Date submitted: 11 Nov 2011

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