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Angular statistics of fluid particle trajectories in turbulence

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— The angle between subsequent particle displacement increments is evaluated as a function of the time lag, following a recent proposition by Burov et al. [1]. First, the link between the investigated angle and the curvature of the trajectories is explained. Subsequently we compare the Lagrangian trajectories in two-dimensional periodic and wall-bounded turbulent flows. We show that at long times the probability density function of the angles carries the signature of the confining domain if finite size effects are present. At short times, the PDF of the cosine of the angle is given by a power law with a well defined exponent, reminiscent of the close to Gaussian character of the velocity field.

[1] Burov, S., Tabei, S. A., Huynh, T., Murrell, M. P., Philipson, L. H., Rice, S. A. & Dinner, A. R. (2013). Distribution of directional change as a signature of complex dynamics. *Proc. Natl. Acad. Sci.*, 110(49), 19689-19694.

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