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Time scale of rotation of inertial fibers in isotropic turbulence ANKUR BORDOLOI, University of California Berkeley, GAUTIER VERHILLE, Aix Marseille Univ, CNRS, Centrale Marseille, IRPHE, EVAN VARIANO, University of California Berkeley — The past few years of research has significantly advanced our understanding of the rotational kinematics of inertial fibers in turbulence and their scaling with size. However, the question related to the time scale of rotational dispersion remains open. The time scale of rotation of inertial fibers is integral to processes such as paper-making, turbulent drag-reduction, fiber-glass blowing, and locomotion of planktonic organisms in the ocean. Based on time-resolved measurements of the orientation of rigid inertial fibers in a turbulence-tank, we compute a time scale (τ_d) fiber rotation. We show that this time-scale can be predicted by Kolmogorov's inertial-range scaling based on fiber length (L) only when the diameter (d) is small. For fibers with large diameters, we invoke our previous theoretical model designed specifically for the variance of fiber rotation and find that it fails to predict τ_d. We propose herein a new model that successfully predicts both these parameters for a wide range of L and d.

Ankur Bordoloi
University of California Berkeley

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