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Measuring the orientation and rotation rate of 3D printed particles in turbulent flow[1] GREG VOTH, GUY G. MARCUS, SHIMA PARSA, STEFAN KRAMEL, RUI NI, BRENDAN COLE, Wesleyan University — The orientation distribution and rotations of anisotropic particles plays a key role in many applications ranging from icy clouds to papermaking and drag reduction in pipe flow. Experimental access to time resolved orientations of anisotropic particles has not been easy to achieve. We have found that 3D printing technology can be used to fabricate a wide range of particle shapes with smallest dimension down to 300 μm. So far we have studied rods, crosses, jacks, tetrads, and helical shapes. We extract the particle orientations from stereoscopic video images using a method of least squares optimization in Euler angle space. We find that in turbulence the orientation and rotation rate of many particles can be understood using a simple picture of alignment of both the vorticity and a long axis of the particle with the Lagrangian stretching direction of the flow.

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