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Length scales in anisotropic turbulence GREGORY BEWLEY, KELKEN CHANG, EBERHARD BODENSCHATZ, Max Planck Institute for Dynamics and Self-Organization — In isotropic turbulence, a single scalar function fully describes the velocity correlation tensor. The characteristic scales of this correlation function, the Taylor scale and the integral scale, then have an unambiguous interpretation. The integral scale, for example, is a measure of the most energetic scale of turbulence. Anisotropic turbulence is more complicated. We examined theoretically and experimentally the relationships between correlation functions measured in two directions in anisotropic turbulence. We found that the ratio of characteristic scales measured in the different directions was a function of the ratio of fluctuating velocities in the two directions. In the case of the integral scale, the inertial range scaling law controls the relationship. In other words, not only is the integral scale a measure of the large scale, but it is also connected to inertial range dynamics.

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