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What correlations between velocity differences and velocity sums tell us about small scale universality GREG VOTH, Wesleyan University — An ongoing question about turbulent flows is the degree to which the small scales are universal because they become independent of the details of the forcing at large scales. Recent work has explored these issues by measuring correlations between velocity differences over a distance r (whose variance is dominated by scales near r) and velocity sums over the same distance (whose variance is dominated by the large scales). Some correlations between velocity differences and sums are required by the Navier-Stokes equations (Hosokawa, Prog. Theor. Phys. Lett., 118:169, 2007.) This talk will look at experimental measurements of correlations between velocity differences and velocity sums from several flows. The correlations which are required by Navier-Stokes dynamics do not appear to violate the assumption of independence between the large and small scales. However, there are other correlations in the experimental data which can only be explained by dependence of the small scales on the details of the forcing of the flows. The variance of the velocity differences shows a strong conditional dependence on the velocity sum that is different in different flows. The anisotropy of the velocity differences also shows conditional dependence on the velocity sum.

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