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Triple-Correlations in Decaying Isotropic Turbulence[1] CLAYTON BYERS, Trinity College, JONATHAN MACART, University of Illinois at Urbana-Champaign, MICHAEL MUELLER, MARCUS HULTMARK, Princeton University — The self-similar scaling approach for decaying isotropic turbulence is utilized to extract constraints on the temporally dependent scaling parameters. The resulting similarity solution and constraints show that the temporal evolution of the length scale, which is shown to be the Taylor microscale, sets the exponent of decay. This exponent is found to retain a dependence on the initial conditions of the flow. Additionally, a new triple-correlation scaling parameter, u^3/Re_λ, is found. The validity of this new scaling is checked in three different ways, each resulting in a collapse of the triple correlation data. The usefulness of this scale becomes apparent when compared to the results of Stewart & Townsend (1951), which utilized the classic u^3 scaling and did not show collapse in their data. Three Direct Numerical Simulations at differing initial Reynolds numbers were performed to test the theoretical results.

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