Abstract Submitted
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A Conditionally Cubic-Gaussian Stochastic Lagrangian Model for Acceleration in Isotropic Turbulence[1] A.G. LAMORGESE, S.B. POPE, Cornell Univ., P.K. YEUNG, Georgia Tech, B.L. SAWFORD, Monash Univ. — The modeling of fluid-particle acceleration in isotropic turbulence via stochastic models for the Lagrangian velocity, acceleration and a dissipation rate variable is considered. We use data from direct numerical simulations (DNS) up to Taylor-scale Reynolds number 650 to construct a stochastic model that is exactly consistent with Gaussian velocity and conditionally cubic-Gaussian acceleration statistics. This model captures both the effects of intermittency of dissipation on acceleration and the conditional dependence of acceleration on pseudo-dissipation (which differs from the Kolmogorov 1962 prediction). The large-time behavior of the new model is that of a velocity-dissipation model that can be matched with DNS data for conditional second-order Lagrangian velocity structure functions. As a result, the diffusion coefficient for the new model incorporates two-time information and their Reynolds-number dependence from DNS. Model predictions for conditional and unconditional velocity statistics are shown to agree well with DNS.

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