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Intermittency and Anomalous Scaling in Synthetic MMLM Turbulence[1] CARLOS ROSALES, Universidad Tecnica Federico Santa Maria, Valparaiso, Chile, CHARLES MENEVEAU, Johns Hopkins University, Baltimore, US — A simple method, the Multiscale Minimal Lagrangian Map (MMLM) approach to generate synthetic turbulent vector fields was introduced (Rosales and Meneveau, Phys. Fluids, 2006). It was shown that the synthesized fields reproduce many statistical and geometric properties observed in real, isotropic, turbulence. We investigate if this procedure, which applies a minimal Lagrangian map to deform an initial Gaussian field, can produce also anomalous scaling in the inertial range. It is found that the advection Lagrangian Map time-scale is crucial in determining anomalous scaling properties. Using a short (CFL-like) time-scale, non-Gaussian statistics and realistic geometric features are reproduced at each scale, but anomalous exponents are not observed (i.e. we observe nearly K41 scaling). Conversely,if the appropriate K-41 inertial-range turnover time-scale is used, realistic anomalous scaling exponents are produced. Remarkably, the intermittency and multifractal nature of the energy dissipation is also found to be quite realistic. The properties of the pressure field derived from the MMLM velocity field are studied. The results shed new light on the minimal dynamical requirements for the generation of anomalous scaling and intermittency in turbulent flow.

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