Abstract Submitted
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Synthesizing non-Gaussian inhomogeneous turbulence using optimization techniques YI LI, University of Sheffield — Synthetic turbulence is an important component of large eddy simulations, where it is used as the initial or inlet condition. Traditional synthetic models have not attempted to reproduce small scale dynamics even though it is important to sustain turbulence development. This problem is attacked recently by a Multi-scale Turnover Lagrangian Map (MTLM) model, which successfully reproduces a range of small-scale statistics in isotropic turbulence. In this talk, we introduce the constrained MTLM method (CMTLM), where optimization technique is used to generate inhomogeneous non-Gaussian MTLM synthetic fields. In CMTLM, the inhomogeneous statistics are set as the target, to be matched by the MTLM field. The MTLM field is found as the solution of an optimization problem with the random Gaussian input to MTLM as the control. We use several cases to show that the optimal MTLM field reproduces the inhomogeneous statistics while maintaining the realistic small scale statistics in many different flow conditions. The method thus proves to be a useful tool for large eddy simulations.

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