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Constrained Optimization for Dynamic Optimal Finite-Volume LES PAULO ZANDONADE, University of Illinois at Urbana-Champaign, ROBERT D. MOSER, University of Texas at Austin — Optimal large eddy simulation models have been shown to produce accurate simulations, but until now they have been based on statistical data obtained from direct simulation. Here, the need for such DNS data is eliminated. A dynamic optimal finite-volume LES (FVLES) model is developed based on the constrained optimization of the mean-square error. Similar to previous optimal models, the present model is a stochastic estimate approximating the ideal LES, but with theoretically derived and dynamically determined correlations replacing the DNS data. In addition, constraints are imposed to control the large-scale dynamical behavior and numerical properties of the model in the presence of the uncertainties introduced by the dynamic procedure. The quadratic part of the model is constrained to be second-order accurate, while the coefficients for the linear part are constrained to be numerically stable. Results from the constrained dynamic FVLES models are compared to dynamic Smagorinsky results for forced isotropic turbulence. While the results are quite promising, the constraints applied to the linear part are *ad-hoc* and must be further justified and analyzed.

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