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Dynamic Optimal Finite-Volume LES and its Application to a Temporally Evolving Plane Mixing Layer ROBERT MOSER, University of Texas at Austin, PAULO ZANDONADE, University of Illinois at Urbana-Champaign — A simple dynamic optimal finite-volume LES model has been developed and applied to a temporally evolving free shear layer. Unlike previous optimal models, the model used here does not depend on DNS data. The necessary velocity correlations for the stochastic estimation procedure, which yields the optimal model, are obtained by assuming isotropy of the turbulence at the filter scale, allowing the use of Kolmogorov's expressions for the third-order, two-point velocity structure functions. The model reduces to a second-order dissipation term whose strength is determined from the consistent kinetic energy dissipation rate and the average kinetic energy dissipation (anti-dissipation) of the numerical treatment of the nonlinear terms. Modifications to the modeling procedure due to the existence of a mean velocity profile and a direction of inhomogeneity are discussed. Results for the dynamic optimal finite-models are compared to the DNS simulations of Rogers and Moser (1994).

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