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Dynamic Lagrangian model and wall model for LES on unstructured grids[1] AMAN VERMA, KRISHNAN MAHESH, University of Minnesota — We discuss a dynamic Lagrangian averaging approach applied in conjunction with the standard dynamic model for large-eddy simulation. Unlike the conventional Lagrangian dynamic model where the Lagrangian time scale contains an adjustable parameter θ, we propose a dynamic time scale based on a "surrogate-correlation" of the Germano-identity error. The absence of any multi-linear interpolation makes this approach particularly suitable for unstructured grids. We also discuss a dynamic wall model obtained by incorporating RANS constraints into a dynamic SGS model. Unlike conventional approaches, Reynolds stresses are used as constraints on the mean SGS stress so that the constraining Reynolds stress closely matches the computed stress only in the mean sense. We use the Germano-identity error as an indicator of LES quality so that the RANS constraints are activated only where the Germano-identity error exceeds a certain threshold. These proposed models are applied to LES of turbulent channel flow at various Reynolds numbers and grid resolutions to obtain significant improvement over the dynamic Smagorinsky model, especially at coarse resolutions.

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