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Large eddy simulation on unstructured meshes using Lagrangian subgrid-scale model for complex turbulent flows STEVEN TRAN, ONKAR SAHNI, RPI, RPI TEAM — Large eddy simulations (LES) provide high fidelity in which the large-scale turbulent structures are resolved while their interactions with the subgrid scales are modeled. In a Smagorinsky-based LES approach, the unresolved stresses are modeled using an eddy viscosity which in-turn involves a model parameter that is unknown *a priori* and varies in space and time for complex problems. Therefore, dynamic procedures are employed to determine this parameter where averaging is applied to make the procedure robust. When applicable, spatial averaging is applied across homogeneous directions. However, for complex flows the Lagrangian subgrid-scale model employing averaging over pathlines becomes attractive. In contrast to the dynamic Smagorinsky model, variational multiscale (VMS) models have also been developed for LES. In this study, we investigate dynamic mixed models for LES based on the combinations of the Lagrangian subgrid-scale model and the residual-based VMS (RBVMS) approach to study complex, inhomogeneous turbulent flows on unstructured meshes. Applications range from flow through a channel to flow over an airfoil at a moderate angle of attack. Experimental and DNS data are used to make comparisons.

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