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A dynamic subgrid-scale eddy diffusivity model with a global model coefficient for passive scalar transport in complex geometry[1]

JUNGIL LEE, HAECHEON CHOI, Seoul National University, NOMA PARK, University of Minnesota — In the present study, a dynamic subgrid-scale eddy diffusivity model is proposed for large eddy simulation of passive scalar transport in complex geometry. The eddy viscosity model proposed by Vreman [Phys. Fluids, 16, 3670 (2004)], which guarantees theoretically zero SGS dissipation for various laminar shear flows, is utilized as the base eddy diffusivity model. The model coefficient is determined by the dynamic procedure based on the method proposed by Park *et al.* [Phys. Fluids, 18, 125109 (2006)] such that the model coefficient is globally constant in space but varies only in time. The large eddy simulations of passive scalar transport in turbulent channel flow and turbulent boundary layer are conducted and the proposed model shows nearly the same performance as the dynamic Smagorinsky model does. Since the proposed model does not require any *ad hoc* clipping and averaging over the homogeneous direction, it can be readily applied to transport of passive scalar in complex flows. Some other examples such as heat transfer in a ribbed channel will be shown in the final presentation.

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