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A dynamic two-level large-eddy simulation method for high Reynolds number flows REETESH RANJAN, SURESH MENON, Georgia Institute of Technology — We present a dynamic hybrid two-level large-eddy simulation method for high Reynolds number flows. The method combines the two level simulation model with a conventional large eddy simulation model through an additive scale separation operator in a dynamic manner. The two level simulation model performs the scale separation through a large-scale function instead of a spatial filtering used by a conventional large eddy simulation model and therefore, it does not from some of the limitations associated with the spatial filtering. The hybrid method ensures that the two level simulation model provides a dominant contribution in flow regions having sharp gradients and in other regions large-eddy simulation model assumes a dominant role leading to an overall efficient computational method for practical applications. The hybridization is achieved through a dynamic and a spatially smooth blending function based on a characteristic length scale. The dynamic evaluation of the blending function is essential for complex flows where a prior contribution of two-level and large-eddy simulation models can not be estimated accurately. Application of dynamic blending function will be demonstrated by simulating high Reynolds number separating/reattaching flow over a bump in a channel.

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