

Abstract Submitted
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A dynamic wall model constrained by RANS Reynolds stress¹
AMAN VERMA, NOMA PARK, KRISHNAN MAHESH — We 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. The proposed model is 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. The model has been implemented in spectral and structured finite volume solvers and is being extended to an unstructured solver. These developments will be discussed.

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Aman Verma
University of Minnesota

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