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The cause and resolution of log-layer mismatch in wall-modeled LES: a new perspective and its implication in complex flows[1] GEORGE PARK, XIANG YANG, PARVIZ MOIN, Stanford University — Log-layer mismatch (LLM) refers to the erroneous shifts of the mean velocity profile in the log-law region when wall models are coupled to the LES solution at the first off-wall grid points. It is often believed that the discretization error and subgrid-scale modeling error in the highly under resolved near-wall region contaminates the first off-wall LES solution, thereby providing inaccurate input to wall models resulting in inaccurate wall shear stress. Placing the LES/wall-model interface a couple of cells away from the wall has been recommended to avoid LLM(Kawai and Larsson, Phys. Fluids 24, 015105 (2012)). However, its non-local nature render this method impractical for flows involving complex geometry, by incurring significantoverhead in LES mesh preparation and wall-model implementation. We propose an alternative remedy for LLM which warrants the removal of LLM while utilizing the first off-wall LES data. The method is based on filtering the wall-model input either in space or in time. It is simple, easy to implement, and would be particularly well suited for unstructured-grid LES involving complex geometries. We also demonstrate that LLM is caused by excessive correlation between the wall-model input and its wall shear stress output.

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