

Abstract Submitted
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Requirements and sensitivity analysis of RANS-free wall modeled LES¹ MICHAEL WHITMORE, ADRIAN LOZANO-DURAN, PARVIZ MOIN, Center for Turbulence Research, Stanford University — Sensitivity analysis of wall modeled LES is performed through theoretical analysis and numerical simulations. Our focus is on the development of robust dynamic-slip RANS-free wall models which provide good performance for different LES subgrid-scale models and numerical discretizations. The study is motivated by the sensitivities observed in the dynamic slip wall models developed by our group (see Bose and Park, ARFM, 2018). Theoretical analysis is used to estimate the error propagation from the wall model inputs (LES velocities and derivatives) into the wall model predictions. We also investigate the impact of grid-scale models and numerics (discretization and grid topology) along with the ability of spatial and temporal filtering of the inputs to reduce these sensitivities. Our analysis is confirmed by actual wall modeled LES calculations of fully developed turbulent channels.

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