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**Validation of Reynolds Stress Transport Models with Velocity/Pressure-Gradient Models in Wall- Bounded Flows**[1]
JUAN D.C. FERNANDEZ, SVETLANA POROSEVA, University of New Mexico, SCOTT MURMAN, NASA Ames Research Center — In the traditional formulation of Reynolds Stress Transport (RST) turbulence models, velocity/pressure-gradient correlations are decomposed into pressure-strain correlations and pressure diffusion terms that are modeled separately. In our study, a potential of a different modeling approach for improving simulation results in the near-wall area is investigated. No decomposition of velocity/pressure-gradient correlations is attempted. New linear models for such correlations have been recently developed and successfully validated against DNS data in two-dimensional incompressible turbulent flows such as a zero-pressure gradient boundary layer over a flat plate and a fully-developed channel flow. The models correctly reproduce DNS profiles of velocity/pressure-gradient correlations up to the wall with the same model coefficients in different geometries and at different Reynolds numbers. These models are currently implemented in transport equations for Reynolds stresses. The compatibility of models for such correlations with existing models for the dissipation tensor and turbulent diffusion is investigated. Simulations are conducted with open-source software OpenFOAM and in-house code in two-dimensional wall-bounded flows.

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