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Formulation and calibration of a stochastic model form error representation for RANS TODD OLIVER, BRYAN REUTER, ROBERT MOSER, The University of Texas at Austin — It is well-known that RANS turbulence models fail to accurately represent the effects of turbulence on the mean flow for many important flows. We consider probabilistic representations of this model inadequacy for wall-bounded flows. The particular probabilistic representations considered here take the form of stochastic differential equations that are loosely based on the Reynolds stress transport equations, but include random forcing to represent uncertainty due to the closure problem. This model is disretized using finite elements and a priori uncertainty quantification studies are conducted using Monte Carlo sampling. The results demonstrate that the resulting uncertainties in the mean velocity scale as desired with Reynolds number. In addition to the random forcing, the model contains a number of uncertain parameters. We demonstrate that these can be calibrated using available DNS data. The model is further tested via comparison against additional DNS data outside of the orignal calibration set.

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