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Epistemic uncertainty quantification of Reynolds stress models XINYI HUANG, NAMAN JAIN, ROBERT KUNZ, XIANG YANG, Pennsylvania State University — Reynolds stress models (RSMs) account for the anisotropy of Reynolds stresses by solving individual transport equations for the terms in the Reynolds stress tensor. The additional equations and the many terms in these equations present a daunting task for modeling. In order to determine which terms are important for the modeling of a shear layer, we quantify the model form uncertainty of the SSG/LRR full Reynolds stress model. Specifically, we perturb the terms in the SSG/LRR model at conditions within a relevant parameter space (of, e.g., the Reynolds number and the Richardson number). Operationally, we employ Morris's one at a time method; but rather than sampling the parameter space randomly, we use more advanced sampling strategies like the minimax, the maximum-entropy and Latin hypercube. Each term in the SSG/LRR model is evaluated in terms of its overall effect on an objective function and whether that effect is consistent in the flow's parameter space.

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