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Investigation of pressure gradient aware wall modeling in LES OLIVIER THIRY[1], GREGOIRE WINCKELMANS, MATTHIEU DUPONCHEEL, Universite catholique de Louvain (UCL) - Institute of Mechanics, Materials and Civil Engineering (iMMC) — This work focuses on the investigation of various wall modeling strategies for the simulation of high Reynolds number wall-bounded turbulent flows with acceleration and/or deceleration. Our code is based on fourth order finite differences, is momentum conserving, and is energy conserving up to fourth order. We here use a "channel flow" set-up, with no slip and wall modeling at the bottom, with slip at the top, and with blowing and/or suction at the top in order to generate the desired acceleration-deceleration profile. Two strategies are investigated and compared. Pressure gradient corrected algebraic models are first considered, and we investigate various local averaging techniques so as to avoid imposing mean profile laws pointwise. RANS sub-layer models are then also considered, where the turbulent viscosity is corrected to account for pressure gradient effects and for resolved LES fluctuations effects. A wall-resolved LES was also performed to provide a reference solution.

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