Abstract Submitted
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High Re wall-modeled LES of aircraft wake vortices in ground effect OLIVIER THIRY[1], GREGOIRE WINCKELMANS, MATTHIEU DUPONCHEEL, Universite catholique de Louvain (UCL) - Institute of Mechanics, Materials and Civil Engineering (iMMC) — We have been able to perform wall-resolved LES, using a fourth order code, to simulate (aircraft) wake vortices interacting with the ground, also with cross or head winds, up to Reynolds numbers of the order of $Re = \Gamma/\nu = 2 \times 10^4$. The present work aims at providing higher Re simulations, and also simulations with rough walls (e.g., grass), through the use of LES with near wall modeling. Various types of models are compared: point-wise and averaged algebraic models, and two-layers models. When using averaged models, the averaging methodology is of importance, since there is essentially no homogeneous direction in the case of wake vortices in ground effects. Uni- and multi-directional averaging strategies, with and without additional time averaging will be considered. When two-layer models are used, a RANS sub-layer will be compared to a simpler approach based on simplified turbulent boundary layer equations. The approaches are first validated on simpler flows, channel flow or wake flow, for which reference wall-resolved LES or DNS results are available.

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