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Drag reduction of boat-tailed bluff bodies through transverse grooves. Part II: large-eddy simulations MARIA VITTORIA SALVETTI, ALESSANDRO MARIOTTI, GUIDO BURESTI, DICI - University of Pisa — The present work focuses on strategies for aerodynamic drag reduction of elongated axisymmetric bluff bodies, which can be viewed as simplified models of a road vehicles. We combine boat-tailing, i.e. a gradual reduction of the body cross-section before a sharp-edged base, with properly contoured transverse grooves. The effectiveness of this strategy was assessed through experiments and simulations. Experiments showed that the introduction of a single groove leads to a further delay of boundary-layer separation and to a reduction of drag compared with the boat-tail configuration without grooves. In this talk, we present Large-Eddy Simulations (LES). LES results agree with the experimental findings. The success of the proposed flow control strategy is due to the relaxation of the no-slip condition in the small recirculation region inside the groove, which reduces the momentum losses near the wall and thus delays boundary layer separation. The effects of the introduction of the groove on the mean topology and on the dynamics of the near wake are also highlighted. Finally, a sensitivity analysis of the proposed control strategy efficiency to the groove location and to the boat-tail geometry is shown.

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