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On the relationship between boundary-layer thickness, base drag and near-wake flow of an axisymmetric bluff body MARIA VITTORIA SALVETTI, ALESSANDRO MARIOTTI, GUIDO BURESTI, DICI, University of Pisa — A large contribution to the aerodynamic drag of a bluff body is given by the low pressures on its base, i.e. the surface lying within the separated wake. In order to develop strategies to decrease drag, a critical issue is the relationship between the base pressure and the flow parameters. The main application is the development of methods for the reduction of the drag of road vehicles. We consider the flow around an axisymmetric body which can be viewed as a simplified model of a road vehicle, for which experiments, LES and DNS were carried out. Both experiments and simulations showed that an increase of the boundary layer thickness before separation reduces the pressure drag of the body. This is connected with an increase of the length of the mean recirculation region behind the body. A detailed analysis of the near wake dynamics is carried out to ascertain whether the variations of the recirculation length, and hence of the base pressure, caused by the modifications of the boundary layer thickness, may be connected with changes in the dynamics of the vorticity structures originating from the instability of the separated shear layers. More generally, this analysis may be also a useful step towards devising further strategies for pressure drag reduction.

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