Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Optimal transient growth in flow past a slanted surface MARCO MARTINS AFONSO, PHILIPPE MELIGA, ERIC SERRE, M2P2, Aix-Marseille Université & Ecole Centrale Marseille & CNRS — We investigate numerically and theoretically the flow past a slanted surface inclined at 25 degrees, mimicking the rear part of a simplified ground-vehicle geometry of the bluff-body type. We are interested in how to reduce the flow separation by the upward generation of contra-rotating longitudinal vortices developing into longitudinal streaks through the lift-up effect. Upon introducing a volumic forcing or a wall velocity perturbation, we use gradients computed with the adjoint method to optimize the energy gain in the domain. Such an analysis is undertaken as a function of the Reynolds number, the wavelength of the perturbation in the transverse direction, and the size and location of the domain over which the gain is estimated. If time permits, we will also perform nonlinear numerical simulations of the controlled flow to assess the nonlinear interaction of the induced perturbation with the natural flow instabilities.

Marco Martins Afonso
M2P2, Aix-Marseille Université & Ecole Centrale Marseille & CNRS

Date submitted: 31 Jul 2014 Electronic form version 1.4