

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Optimal open-loop control of the recirculation length in the wake of a cylinder EDOUARD BOUJO, FRANCOIS GALLAIRE, LFMI, EPFL, Lausanne, Switzerland — We consider steady equilibrium solution of the 2-D Navier-Stokes equations describing the flow around a circular cylinder. It is well known that, for moderate Reynolds numbers, the recirculation length is an increasing function of the Reynolds number. We first express the recirculation length as a cost-functional and then use a Lagrangian-based optimization procedure to compute the linear sensitivity of the recirculation length with respect to base flow modifications, localized bulk point forces and blowing and suction at the cylinder wall. The results are compared to nonlinear steady-state computations. The influence of a shortened or increased recirculation on the stability of the flow above threshold ($Re=47$) is finally discussed.

Francois Gallaire
LFMI, EPFL, Lausanne, Switzerland

Date submitted: 01 Aug 2012

Electronic form version 1.4