Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Closed-loop control of experimental shear flows using MLC[1]
THOMAS DURIEZ, Universidad de Buenos Aires, Argentinia, VLADIMIR PAREZANOVIĆ, KAI VON KRBEK, LAURENT CORDIER, BERND R. NOACK, JEAN-PAUL BONNET, PPRIME, Poitiers, France, MARC SEGOND, MARKUS W. ABEL, Ambrosys GmbH, Germany, NICOLAS GAUTIER, JEAN-LUC AIDER, PMMH, ESPCI, France, CÉDRIC RAIBAUDO, CHRISTOPHE CUVIER, MICHEL STANISLAS, LML, Lille, France, ANTOINE DEBIEN, NICOLAS MAZELLIER, AZEDDINE KOURTA, PRISME, Orléans, France, STEVEN BRUNTON, Universty of Washington, USA — We employ a novel closed-loop control strategy for turbulent flows using machine learning methods in a model-free manner (see MLC talk of B. R. Noack). MLC yields in-time control of experimental shear flows and has advantages over the state-of-the-art control. In this talk, MLC is applied to four different experimental closed-loop control setups: (1) the TUCOROM mixing layer tunnel (talk of V. Parezanović), (2) the Görtler PMMH water tunnel with a backward facing step, (3) the LML Boundary-Layer wind tunnel with a separating turbulent boundary layer, and (4) the Malavard wind tunnel with the SepaCoDe ramp. In all cases, MLC finds a control which yields a significantly better performance with respect to the given cost functional as compared to the best previously tested open-loop actuation.

[1]Funding of the ANR Chair of Excellence TUCOROM, of the ANR grant SepaCoDe, of the EC's Marie-Curie ITN program, and of Ambrosys GmbH is acknowledged.

Bernd R . Noack
PPRIME, Poitiers, France

Date submitted: 31 Jul 2014 Electronic form version 1.4