Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Stability and sensitivity analysis of experimental flow fields measured past a porous cylinder** SIMONE CAMARRI, Dept. of Aerospace Engineering - University of Pisa, JENS H.M. FRANSSON, BENGT E.G. FALLENIUS, Linné Flow Centre, KTH Mechanics — It is known in the literature that the linear stability analysis of the time-averaged flow field past a circular cylinder, after the primary wake instability, predicts a global mode that is marginally stable with a frequency in time that well approximates the one of the saturated vortex shedding. This behavior has been recently shown to hold up to Reynolds number $Re = 600$ by DNS simulations [Leontini et al., JFM 645, pp. 435-446, 2010]. Here we carry out a stability/sensitivity analysis of the PIV velocity fields measured in the wake past a porous circular cylinder at $Re \simeq 8.3 \cdot 10^4$ [Fransson et al., JFS 19, pp.1031-1048, 2004]. Different intensities of uniform suction/blowing through the cylinder surface are considered. The objectives of this work are the following. Firstly, we extend the analysis described in [Leontini et al.] at higher values of $Re$. Moreover, the global direct and adjoint modes, derived from the experimental data, are used to locate the core of the instability, to realign the instantaneous flow snapshots in phase and, thus, to help in the analysis of the experimental data. Lastly, it is shown that the sensitivity of the marginally stable eigenvalue to a generic variation of the mean flow provides hints for the control of the vortex-shedding frequency.

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Date submitted: 02 Aug 2011 Electronic form version 1.4