**Mean-flow reconstruction by data-assimilation techniques from PIV-measurements of flow over an idealized airfoil** NICOLAS DOVETTA, LadHyX - Ecole Polytechnique, DIMITRY P.G. FOURES, DAMPT - University of Cambridge, DENIS SIPP, ONERA, PETER J. SCHMID, LadHyX - Ecole Polytechnique, BEVERLEY J. MCKEON, GALCIT- CalTech — Measurements (experimental or numerical) typically contain a low-dimensional representation of a high-dimensional flow field. The methodology that extracts the non-measured components of the flow by matching a parametrized model to the data is referred to as data-assimilation. Flow around an idealized airfoil ($Re = 20000$) is measured using time-resolved PIV which produces the mean velocity field by averaging over a sequence of snapshots, as well as the velocity fluctuations. The mean flow is assumed to be known in only part of the flow domain. The assumed relationship between a mean flow measurement and the Reynolds Averaged Navier-Stokes equations is used together with a data-assimilation strategy in order to recover the mean flow everywhere from artificially limited input data. The estimated and measured mean flows are compared to illustrate the potential and effectiveness of the data-assimilation technique.

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