Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Model reduction and feedback control of the Blasius boundary-layer SHERVIN BAGHERI, LUCA BRANDT, DAN HENNINGSON, Linne Flow Centre, KTH Mechanics Department, Stockholm — Low-dimensional models of the transitional flat-plate boundary layer are considered for the design of feedback control. In particular, the recently introduced technique for approximating balanced truncation for very large systems using the method of snapshots is considered. This projection basis is computed from a composite snapshot set consisting of the impulse response of both the direct and adjoint linearized Blasius flow. The reduced-order model preserves flow states that are both controllable and observable and thus captures input-output characteristics of the flow, making it a natural projection basis for flow control. The error of the flow approximation obtained from balanced truncation is computed in terms of transfer function norms and compared to other commonly used methods for model reduction, such as Proper Orthogonal Decomposition (POD). The reduced-order model is then used to design a feedback control strategy such that the perturbation energy is minimized.

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Date submitted: 01 Aug 2007 Electronic form version 1.4