Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Feedback Control of an Ahmed Body Flow Exhibiting Symmetry-Breaking Regimes OLGA EVSTAFYEVA, AIMEE MORGANS, Imperial College London — At motorway speeds two-thirds of usable engine energy of square-back vehicles is spent overcoming the aerodynamic drag. The main source of drag is the bi-stable low pressure wake which forms at the back of the body as the boundary layers separate over the rear edges of the vehicle. Identifying large coherent structures and describing the physics of the wake is, therefore, of great practical importance for understanding the sources of drag and informing drag-reduction strategies. Present work investigates numerically the flow past the Ahmed body - a commonly used test-case for a simplified vehicle geometry, at Reynolds numbers $310 < Re_H < 435$. Previously reported experimental results on the bifurcation scenario for symmetry breaking of the Ahmed body wake (Grandemange et. al., 2012) are reproduced in Large Eddy Simulations and using data from the full 3D flow-field, the destabilising dynamics of the wake and vortex systems are investigated further. Dynamic Mode Decomposition is performed to identify the main coherent structures and their frequencies and growth rates. A practical feedback control strategy is then implemented to achieve base pressure recovery yielding a concomitant drag reduction.

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Date submitted: 30 Jul 2016 Electronic form version 1.4