

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

**Feedback Control of a Square-Back Ahmed Body Flow for Form-
Drag Reduction** OLGA EVSTAFYEVA, AIMEE MORGANS, None — Road transport accounts for roughly 22% of CO_2 emissions worldwide, and at highway speeds two thirds of usable energy is consumed overcoming aerodynamic drag. For square-back vehicles, aerodynamic drag is dominated by form- drag, originating from pressure difference between the front and the back face (base) of the vehicle. This study explores using feedback control to increase mean base pressure and thus reduce the form-drag of 3D Ahmed body flows at low (laminar) and medium (transitioning to turbulence) Reynolds numbers. Using Large Eddy Simulations as a test-bed, a linear control strategy to attenuate base-pressure force fluctuations is investigated. Body-mounted sensing and actuation is used: sensing of the base pressure force fluctuations, and actuation of a zero-mean slot jet just ahead of the base. The dynamic linearity of the response to actuation is tested and a feedback controller then designed using frequency domain harmonic forcing system identification data. Recent advances in understanding of the Ahmed body wake dynamics such as top-to-bottom and left-to-right bi-stable behaviour, are considered in the feedback control implementation.

Olga Evstafyeva
None

Date submitted: 31 Jul 2015

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