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Drag Reduction of the Square-back Ahmed Body Using a Sweeping Jet Actuator[1] DHAMOTHARAN VEERASAMY, ABDUL RAOUF TAJIK, VLADIMIR PAREZANOVIC, Khalifa University, Abu Dhabi, UAE, LUC PASTUR, IMSIA-ENSTA Institut Polytechnique de Paris, Paris, France — The wakes of 3-D square back bluff bodies are dominated by a reflectional-symmetry breaking mode, which causes the wake to randomly switch between two asymmetric states, exhibiting a bi-stable behavior. It has been established that drag reduction can be achieved if the bi-stable wake is transformed into a stable symmetric wake[2]. We endeavour to achieve symmetric wake using a large-scale Sweeping Jet (SWJ) actuator at the base of the bluff body. In the present experiment, the SWJ was integrated at the top, mid and bottom positions at the bluff body base. The jet is injecting momentum into the wake by a sweeping motion at a frequency determined by the actuator mass flow rate. The sweeping motion of the jet is in the horizontal plane, and is periodically forcing the bi-stable wake switching. The resulting state switching statistics, topology of the wake and drag of the bluff body are ascertained through pressure and force measurements and PIV. Force measurements reveal a drag reduction of 2% for the optimal position and mass flow rate of the SWJ actuator. Moreover, in comparison with the literature on continuous steady jet at the base, it is found that the SWJ is much more energy-efficient for drag reduction.

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[2]O.Cadot et al., **Phys. Rev.E** 91, 2015

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