Abstract Submitted
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Control of the reflectional symmetry breaking mode of a square-back bluff body wake using a sweeping jet actuator[1] VLADIMIR PAREZANOVIC, ABDUL RAOUF TAJIK, Khalifa University of Science and Technology, LUC PASTUR, IMSIA-ENSTA Institut Polytechnique de Paris — The wake of a square-back 3D bluff body is dominated by a stochastic switching between two reflectional symmetry breaking wake flows[2]. The two mirror wakes are associated with an increased drag. We attempt to symmetrize the wake using a Sweeping Jet (SWJ) actuator located at the top of the bluff body base. Arrays of SWJs have been used to reduce the drag of the 3D bluff body by reattaching the flow to an angled back[3] or to trailing edge flaps[4]. In our study, only a single SWJ is used, and its exit nozzle almost spans the entire width of the bluff body base. The SWJ produces a jet which oscillates horizontally, along the same direction of the bistable wake switching. The sweeping motion of the jet is intended to interact with the wake state switches, which may lead to a symmetric wake. Base pressure measurements reveal a wake locked in a symmetric state in the horizontal plane, for a certain range of actuator mass flow rates. This result is accompanied by a change in the vertical orientation of the wake. Force and PIV measurements are used to elucidate on the wake modifications.

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[3]M. Metka and J. W. Gregory, **J. Fluids Eng.** 137 (5), 051108
[4]J. Schmidt et al., **Exp. Fluids** 56, 151

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