Abstract Submitted
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Flow Control Behind Bluff Bodies through the Interaction of a Resonant Flexible Tail[1] SAMUEL SHELLEY, University of Exeter, JOHN SMITH, DSTL, ROY SAMBLES, ALASTAIR HIBBINS, SIMON HORSLEY, University of Exeter — Steady uniform flow, incident upon a bluff body can separate causing a wake to form. This can lead to the periodic shedding of vortices behind the body. In previous work, the effect on both the drag and vortex shedding frequency (VSF) of adding a thin flexible tail to the rear of a bluff body in the Laminar regime was investigated. This was done through modelling with the length, stiffness and inflow velocity being varied. This made it possible to match the resonant frequencies of the tail to the natural VSF of the structure. It was found that when one of the resonant frequencies of the tail matched the natural VSF of the body, one of the vibrational modes of the tail would be strongly excited. A sharp increase in both drag and VSF is also predicted. The locations of these jumps could be predicted using an eigenvalue solver. In the present work we conduct experiments to verify these results. Particle image velocimetry measurements are taken as a cylinder, with a neoprene rubber tail, is towed through water. This allows us to extract the vortex shedding frequency and the vibrational motions of the tail. Both the length of the tail and the towing speed are varied to match the resonant frequencies of the tail to the VSF of the body.

[1]DSTL

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