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Observability of the turbulent wake behind an axisymmetric bluff body ROWAN BRACKSTON, ANDREW WYNN, JONATHAN MORRISON, Imperial College London — Closed loop control of bluff body wakes has been a topic of active research for some time, with one key objective being the reduction of the aerodynamic drag of road vehicles. The implementation of closed loop control requires continuous measurements of system properties from which the 'state' of the system can be deduced. In the context of bluff body flows surface pressure is one of the easiest variables to measure, however it remains an open question as to how much of the structure of the flow can be deduced from surface pressure information. In this investigation the wake behind an axisymmetric bluff body ($\mathrm{Re} = 2 \times 10^5$) was observed using time resolved PIV and simultaneous pressure measurements on the base of the body. Analysis and decomposition of the velocity field allows an improved understanding of the three dimensional features in the wake that can be used for modeling and control purposes. Furthermore, by examining the simultaneous velocity and pressure data it is possible to establish which of these features can be deduced based upon surface pressure data alone. This understanding will enable the future design of closed loop flow control systems that use surface pressure measurements as the controller input signal.

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