

Abstract Submitted
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The dynamical states of a circular cylinder wake influenced by a leeward control rod MURILO CICOLIN, PETER BEARMAN, OLIVER BUXTON, Imperial College London, GUSTAVO ASSI, University of Sao Paulo — Experiments were carried out in a recirculating water channel with a circular cylinder fitted with one control rod at different positions. The rod had a diameter 10 times smaller than the main cylinder. The distance between the centre of cylinders was kept constant ($R/D=0,7$) and the angle between them varied from 40 to 90 degrees, when at 0 degrees the control cylinder is placed in the wake on a line passing through the front stagnation point of the main cylinder and its centre. Reynolds number was 20,000 for all cases, based on the main cylinders diameter. High-resolution PIV fields were acquired focusing on the two-dimensional wake of both cylinders. Results showed that for all cases the control rod induced a significant change in the wake when compared to the bare cylinder. Three main dynamical states were identified according to the position of control rod across the shear layer: immersed in the recirculation region, in the middle of shear layer or outside of it. Moreover, a bistable transitional state was identified between the first and second states. The second state shows a suppression of vortex shedding and a significant reduction of drag forces for the combined system.

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