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Time-Resolved PIV in the Flow Around Cylinders Under the Effect of Coriolis Forces FILIPPO COLETTI, Stanford University, IGNACIO MAYO YAGUE, TONY ARTS, von Karman Institute for Fluid Dynamics — The effect of Coriolis forces on the dynamics of bluff body wakes is relevant to fields as diverse as turbomachinery and meteorology. Nevertheless such flows are largely unexplored, due to practical difficulties in measuring velocity in the rotating frame of reference. We present both ensemble-averaged and time-resolved PIV measurements around square and circular cylinders at Re=1000, in the presence of system rotation around an axis parallel to the cylinder. The PIV system, including a continuous laser diode and a high speed CMOS camera, is put in rotation on the same turntable as the test section at an angular velocity of 130 rpm, for a rotation number of Ro=0.13. The unique arrangement allows the same level of accuracy and spatio-temporal resolution as in a non-rotating rig. Coriolis forces break the wake symmetry, resulting in one cyclonic and one anti-cyclonic shear layer shed from the opposite sides of the cylinder. For the square cylinder the fluid entrainment from the cyclonic to the anti-cyclonic side deforms the flow topology to the point that only one focus is present in the mean wake. Time series and space-time two-point correlations suggest an overall loss of periodicity and coherence in the presence of system rotation.

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