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Design of an End Plate to Promote Quasi-Two-Dimensionality in the Near-Wake of a Circular Cylinder TAYFUN AYDIN, ADAM BLACKMORE, ALIS EKMEKCI, University of Toronto — To design an end plate that attains nearly parallel vortex shedding from a circular cylinder with an aspect ratio of L/D = 12.3 at $Re_D = 10,000$, effect of a rectangular end plate on spanwise flow uniformity is investigated experimentally. Experiments are carried out in a free-surface re-circulating water channel. At one end, the cylinder is bounded by the end plate; and at the other end, by the free surface. Leading edge distance of the end plate from the cylinder axis is varied from 0.5D to 7.0D by the repositioning of the cylinder. The spanwise flow structure on the plane of symmetry of the cylinder, coincident with its centerline, is determined via Particle Image Velocimetry (PIV). Spanwise distributions of streamwise and spanwise velocity contours on this plane are used for the quantitative determination of the degree of spanwise two-dimensionality. Our results indicate that the flow uniformity in the near-wake is highly dependent on the leading/trailing edge distances of the end plate from the cylinder centerline, and a leading edge distance of about 2.5D promotes the best distribution in terms of flow uniformity.

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