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Vortex suppression in the wake of counter rotating cylinders PETER DEWEY, ALEXANDER J. SMITS, Princeton University — Digital particle image velocimetry is used to study the flow past a pair of counter rotating cylinders placed side-by-side normal to the freestream flow direction. The Reynolds numbers based on cylinder diameter is varied from 100 to 200 and gap-to-diameter ratios of 1, 3 and 5 are considered. An unsteady wake consisting of a pair of von Kármán vortex streets is present in the flow field when the cylinders are rotated below a critical value. Above this critical value, counter rotation of the cylinders suppresses vortex formation. The critical rotational speed varies only slightly with Reynolds number but exhibits a strong dependence on the gap-to-diameter ratio. As the gap-to-diameter ratio increases, the critical rotational speed approaches values expected to suppress vortex formation for a single rotating cylinder, indicating that the wakes of the cylinder pair have more interaction for small gap-to-diameter ratios. At sufficiently high rotational speeds the streamlines around the cylinder pair resemble a doublet potential flow. The experiments were inspired by the computations performed by Andy Chan and Antony Jameson at Stanford University.

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