Evolution of a vortex street in the far wake of a cylinder

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The evolution of a primary vortex street shed from a circular cylinder in the far wake is experimentally examined for 70 < R < 154 (R is the Reynolds number). According to the vorticity fields obtained using digital image processing for visualized flow fields, the primary vortex street breaks down into a nearly parallel shear flow of Gaussian profile at a certain downstream distance, before a secondary vortex street of larger scale appears further downstream. The process leading to the nearly parallel flow can be explained as the evolution of the vortex regions of an inviscid fluid if we invoke the observation that the distance between the two rows in the primary vortex street increases with the downstream distance, although the viscous effect probably contributes to this increase. Numerical computations with the discrete vortex method also support this explanation. The wavelengths and speeds of the primary and secondary vortex street are also measured.

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