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Flow Field in the Near Wake of a Disk and Cup¹ ELHAM GHAEM-MAGHAMI, WPI, KENNETH DESABRAIS, US Army NSRDEC, HAMID JO-HARI, Cal State University Northridge — To investigate the flow field in the near wake of axisymmetric bluff bodies with fixed separation location, experiments with a disk and smooth cup were conducted in a water tunnel at a Revnolds number of 3.2×10^4 and in a wind tunnel at a Reynolds number of 1.9×10^5 . The velocity field in the water tunnel was measured by the stereo particle image velocimetry technique while a hot-wire was used in the wind tunnel. Data were collected over an axial range extending to 9 diameters downstream. The mean and fluctuating velocity fields were measured for both Reynolds numbers while Reynolds shear stresses were measured only in the water tunnel. Streamlines computed from the average velocity field revealed that the recirculation zone extends to approximately 2 diameters downstream. The mean velocity deficit profiles for the cup and disk had very similar behavior beyond 3 diameters, but the cup wake appears to recover quicker than the disk. The turbulent shear stress and fluctuating velocity profiles were also very comparable between the cup and disk. The Reynolds number had a weak effect on the flow field, at least for the two values considered.

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