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PIV investigation of a shallow wake ARINDAM SINGHA, A. SHINNEEB, R. BALACHANDAR, University of Windsor — Shallow wake, generated by shallow flow past a bluff body, has very distinct characteristics different from a conventional deep wake. The presence of the bounding surfaces (bed and free surface) imparts significant three-dimensionality to the flow. Although many wakes encountered in nature and in engineering applications can be classified as shallow, few studies have been carried out to explore this flow. The present study is aimed towards understanding the characteristics of a typical shallow wake using particle image velocimetry (PIV). The shallow wake is generated by a sharp-edged bluff body, placed in a boundary layer type of flow with freestream velocity of 0.19 m/s (Reynolds number based on momentum thickness ≈ 735). Measurements are taken at near-bed, mid-depth and near free-surface horizontal planes behind the body. The analysis of the mean velocity field shows drastic effect of the bed as well as free surface. The extent of the wake, as well as the half-width and entrainment characteristics at different horizontal planes clearly show three-dimensionality of the near-wake flow field. Proper orthogonal decomposition technique is also applied to understand the dynamics of the large-scale structures of the shallow wake.

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