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Experimental characterization of three-dimensional flow vortical structures in submerged hydraulic jumps

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Abstract

The characteristics of three-dimensional vortical flow structures in submerged hydraulic jumps (generated downstream of a sluice gate) are analyzed in this paper. Results of a careful experimental investigation of the mean flow as well as turbulence statistics obtained with the use of Acoustic Doppler Velocimetry (ADV) and Particle Tracking Velocimetry (PTV) are presented and discussed. Experiments encompass incident Froude numbers (Fr_1) of 3, 4 and 5, and submergence factors (S) ranging from 0.18 to 1.04. First, distributions in three vertical planes of values of the stream-wise velocity component and turbulent kinetic energy (TKE) are shown. With this information, the influence of Fr_1 and S on turbulence statistics is assessed. For the first