

Monitoring of surface velocity of hyper-concentrated flow in a laboratory flume by means of fully-digital PIV

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High flow conditions, which are generally characterized by high sediment concentrations, do not permit the use of traditional measurement equipment. Traditional techniques usually are based on the intrusive measure of the vertical profile of flow velocity and on the linking of water depth with the discharge through the rating curve. The major disadvantage of these measurement techniques is that they are difficult to use and not safe for operators especially in high flow conditions. The point is that, as literature shows (see as an example Moramarco and Termini, 2015), especially in such conditions, the measurement of surface velocity distribution is important to evaluate the mean flow velocity and, thus, the flow discharge. In the last decade, image-based techniques have been increasingly used for surface velocity measurements (among others Joeau et al., 2008). Experimental program has been recently conducted at the Hydraulic laboratory of the Department of Civil, Environmental, Aerospace and of Materials Engineering (DICAM) – University of Palermo (Italy) in order to analyze the propagation phenomenon of hyper-concentrated flow in a defense channel. The experimental apparatus includes a high-precision camera and a system allowing the images recording. This paper investigates the utility and the efficiency of the digital image-technique for remote monitoring of surface velocity in hyper-concentrated flow by the aid of data collected during experiments conducted in the laboratory flume. In particular the present paper attention is focused on the estimation procedure of the velocity vectors and on their sensitivity with parameters (number of images, spatial resolution of interrogation area,) of the images processing procedure.

References

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