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A simple measuring technique of surface flow velocity to analyze the behavior of velocity fields in hydraulic engineering applications.

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An important achievement in hydraulic engineering is the proposal and development of new techniques for the measurement of field velocities in hydraulic problems. The technological advances in digital cameras with high resolution and high speed found in the market, and the advances in digital image processing techniques now provides a tremendous potential to measure and study the behavior of the water surface flows.

This technique was applied at the Laboratory of Hydraulics at the Technical University of Catalonia – Barcelona Tech to study the 2D velocity fields in the vicinity of a grate inlet. We used a platform to test grate inlets capacity with dimensions of 5.5 m long and 4 m wide allowing a zone of useful study of 5.5m x 3m, where the width is similar of the urban road lane. The platform allows you to modify the longitudinal slopes from 0% to 10% and transversal slope from 0% to 4%. Flow rates can arrive to 200 l/s. In addition a high resolution camera with 1280 x 1024 pixels resolution with maximum speed of 488 frames per second was used.

A novel technique using particle image velocimetry to measure surface flow velocities has been developed and validated with the experimental data from the grate inlets capacity.

In this case, the proposed methodology can become a useful tools to understand the velocity fields of the flow approaching the inlet where the traditional measuring equipment have serious problems and limitations.

References

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