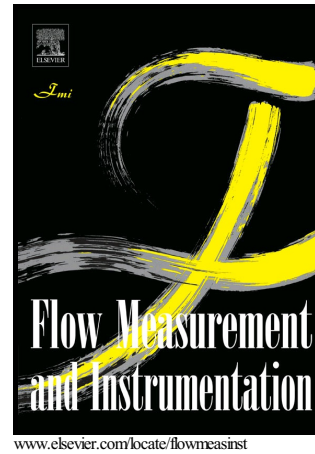


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Application of the submerged experimental velocity profiles for the sluice gate's stage-discharge relationship

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Abstract

Sluice gates have been widely used and intensively studied, however their submerged flow conditions still call for in depth attention. A large scale experimental setup equipped with Acoustic Doppler Velocimetry, ADV, and electromagnetic flow-meter was used to thoroughly investigate various aspects of the hydraulics of submerged sluice gate. In this study, new experimental data sets are provided, that help better understand and quantify the flow features for submerged sluice gates. According to the experimental data generic fitting are provided for the velocity profiles from which the velocity correction factors can be obtained. Then, the experimentally obtained submerged head loss coefficient is presented and discussed. The results of this study showed that current classical Energy-Momentum methods (EM) failed to accurately determine the flow rate for the cases of highly submergences, while employing the interaction of the energy correction factors and head loss values in the EM model would result in more accurate head-discharge estimation. The new data set provided in this work can be used effectively for the validation of numerical modeling of submerged sluice gates.

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