عنوان مقاله:

Evaluating mathematicalmodelsfor velocity distributionand dip phenomenon inrectangular open channels

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خلاصه مقاله:

The velocity distribution of open-channel flows (particularly narrow open-channels) has been a topic of interest to hydraulic engineers and researchers for many years. In narrow open channel flows, the three- dimensional structure of the flow and strong secondary currents mainly near the walls causes the maximum velocity to occur below the free surface, which is called dip phenomenon. Therefore, new mathematical models are required to be able to describe this phenomenon in the velocity distribution profiles. In this paper, a proposed semi-analytical equation for velocity distribution is compared with three other models (namely Dip Modified Log law, full Dip Modified Log Wake law, and total Dip Modified Log Wake law). All these models are capable of predicting the dip phenomenon and the velocity negative gradient near the free surface. Data collected from a rectangular laboratory channel was used to test the validity of the models in estimating the longitudinal velocity profile in narrow channels. The results showed that all models describe the velocity profiles acceptably, however the proposed model gives the best agreement with the experimental data and provides the least error compared to the rest of models. Also it is more successful in predicting the position of maximum velocity below the free surface.

کلمات کلیدی:

velocity distribution, dip phenomenon, rectangular open channel

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