Optimisation Of Stilling Basin Chute Blocks Using a Calibrated Multiphase RANS Model

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Abstract

Interaction between chute blocks and highly aerated flows has been studied in this paper. For this purpose, a RANS model coupled with a calibrated turbulent air entrainment model, VOF method and RNG k - ε turbulence model have been employed. This has allowed analysing the complex multiphase flows behaviour in an USBR type II stilling basin with variable chute block height. Furthermore, conducted simulations exhibit some similarities with flow patterns detected in previous B-jump, hydraulic jump and highly aerated flows experimental studies. Finally, it has been also possible to identify two different mechanisms involving the chute blocks effect upon the flow: turbulent rough wall jet and flow deflector. Turbulent wall jet mechanism takes place for lower values of the chute block height and helps to stabilise hydraulic jump for deficient tail water conditions while flow deflector has not shown to be a desirable mechanism in a stilling basin.

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