






Discharge estimation using brink depth over a trapezoidal-shaped weir

Nashwan K. Alomari ^a , Azza N. Altalib ^a , Ahmed Mohammed Sami Al-Janabi ^b  

Show more 

 Add to Mendeley  Share  Cite

<https://doi.org/10.1016/j.flowmeasinst.2023.102454> 

[Get rights and content](#) 

Abstract

A weir is an accurate hydraulic structure for estimating water discharge in open channels and rivers. It can be constructed with a standard shape with vertical upstream and downstream faces or it can be modified by inclining one or both weir faces to enhance its hydraulic characteristics. In this study, the feasibility of using the brink depth over a trapezoidal-shaped weir (y_b) for discharge estimation was experimentally investigated for free flow conditions. The experimental work involved the use of three lengths of the weir crest, L (10, 20, and 30) cm, and four different slopes (37° , 54° , 75° , and 90°) for both upstream and downstream faces, each with different water discharge. In addition, the effect of channel bed slopes on the water head over the weir (h) and the brink depth (y_b) was investigated. The results indicated that the (y_b) can be used for discharge estimation with good accuracy for a trapezoidal-shaped weir instead of water head over the weir (h), which is usually used in estimating water over the weir, as (y_b) does not affect by the channel bed slope and insignificantly affected by changing the upstream and/or downstream face angle, contrary to the (h). Hence, an empirical equation for estimating water discharge based on (y_b) with different upstream and downstream slopes was developed and examined using some available previous studies data. The mean absolute percentage error (MAPE) between (y_c/L) with (y_b/L) and between the measured and estimated discharge is 4.73% and 7.02%, respectively.