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Laboratory Investigation of the Effect of Wall Slope on the Discharge Coefficient of Trapezoidal Arced Labyrinth Weirs

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Abstract

Weirs of the labyrinth have some advantages including the high coefficient of the irrigation of weir and the low fluctuation of water when the flow passes over the crest of the weir. In this research, the flow rate coefficient has been investigated by changing the weir geometry in terms of wall slope, arc cycle angle, and nose length change in the upstream and downstream of each cycle of the trapezoidal arc labyrinth weir. A total of 240 tests have been performed on 16 different physical models in a channel with a width of 120 cm and a narrowing of 20 cm from each wall. All models have been compared with the control model (normal labyrinth weir) (80A). The results showed that the 80B weir with an arc cycle angle of 20 degrees and without wall slope has a better performance than other weirs. Also, the weir with an arc cycle angle and a wall slope of 20 degrees in a divergent form (D20B) in the area (H_t/P) <0.31 has a better performance than other weirs with an arc cycle angle of 20 degrees, and after this area, the weir with a wall slope of 10 degrees has performed better in divergent form (D10B). In weirs with different cycles at an arc cycle angle of 20 degrees, the labyrinth weir with 5 cycles (N5) has performed better up to the point (H_t/P)=0.36. Also, at the maximum point, the difference is 13 and 17%, respectively, compared to the 4-cycle and 3-cycle weirs.

Keywords: Hydraulic parameters, Labyrinth weirs, Wall slope, Flow coefficient

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