

DISCHARGE RELATIONS FOR COMPOUND BROAD-CRESTED WEIRS

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The broad-crested weir is a simple discharge measurement device. It is broadly used to measured water discharge in the field with acceptable accuracy. Many researchers have studied the relations of flow discharge over a broad-crested weir, such as Bazin (1896), Horton (1907), Govinda Rao and Muralidhar (1963), Bos (1976), Raju and Asawa (1979), Hager (1994), among others. They just focused on the discharge relations for broad-crested weirs with a simple cross-section shape, such as rectangular, triangular, and trapezoidal.

The flow discharge relation over a simple broad-crested weir has been well studied. Discharge relations for compound sharp-crested weirs have been studied by Jan, et. al (2005). However, discharge relations for compound broad-crested weirs have not been discussed yet. On the basis of this reason, discharge relations for four kinds of compound broad-crested weirs, such as rectangular-rectangular (RR), rectangular-trapezoidal (RT), triangular-rectangular (TR), and triangular-trapezoidal (TT) broad-crested weirs were theoretically established by linearly combining the discharge relations of rectangular and triangular broad-crested weirs, and were compared with experimental measurements in the present paper.

A series of experiments for flow over the broad-crested weir were also conducted in a laboratory flume for verification of the so-developed discharge relations. The results show that discharge relations developed in the present paper could well describe the flow discharge over the four compound broad-crested weirs at least in the ranges of experiment conditions, and the calculated discharges from the so-developed discharge relation are well close with the measured ones as shown in Fig. 1 to Fig. 4.

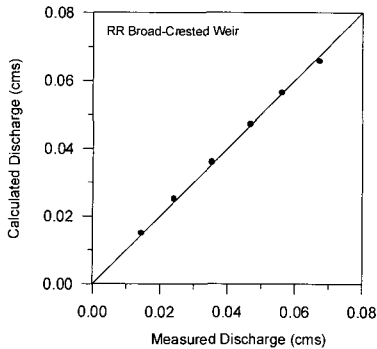


Fig. 1 Calculated Discharge versus Measured Discharge

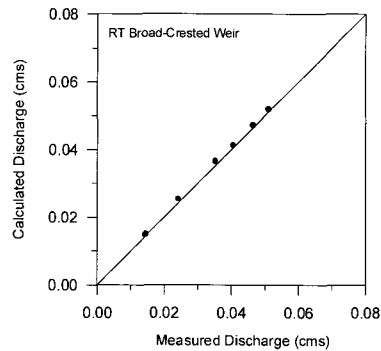


Fig. 2 Calculated Discharge versus Measured Discharge

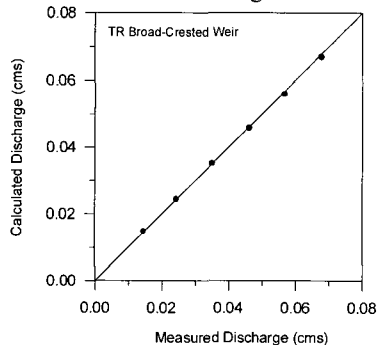


Fig. 3 Calculated Discharge versus Measured Discharge

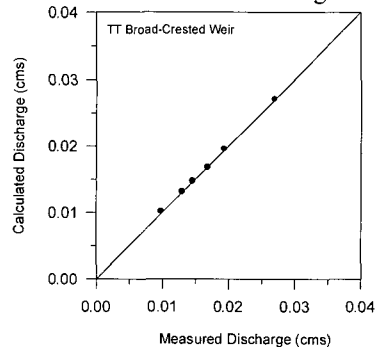


Fig. 4 Calculated Discharge versus Measured Discharge

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