

Effect of crest height on flow characteristics of semi-circular bottom contraction weirs

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■ **ABSTRACT** : Accurate water measurements systems enable accurate accounting of water use, and permit the available water to be supplied at optimum rates to the areas where it is intended to be used. A perfect understanding of some of the primary principles relating to the subject of water measurement is, therefore, necessary for establishing any water measurement system in the canal commands of irrigated agriculture. All the four weir types have enabled creation of critical flow conditions within the throat section, which indicate their suitability for measurement of water in open channels in general. All the four design crest heights (25 cm (Weir-I), 20 cm (Weir-II), 15 cm (Weir -III) and 10 cm (Weir-IV)) are found to be acceptable excepting for 90 per cent submergence level condition. Critical depth (section) has occurred at only one location in the throat section for all the weirs under all possible conditions. The crest height has increased from 10 cm to 25 cm and then location of the critical section has moved towards the upstream side from 1.6 to 0.8 cm, 1.7 to 1.0 cm, 1.8 to 1.1 cm for 24 Ls^{-1} discharge under free flow, 60 per cent, 75 per cent submergence conditions, respectively. For 18 Ls^{-1} discharge, crest height has increased from 10 cm to 25 cm, and then location of the critical section has moved towards the upstream side from 7.0 to 3.1 cm, 7.1 to 3.3 cm, 7.3 to 3.5 cm under free flow 60 per cent, 75 per cent submergence conditions, respectively. For 12 Ls^{-1} discharge, crest height has increased from 10 cm to 25 cm and then location of the critical section has moved towards the upstream side from 8.1 to 4.7 cm, 7.1 to 4.9 cm, 8.3 to 5.0 cm under free flow 60 per cent, 75 per cent submergence conditions, respectively. Crest height has increased from 10 cm to 25 cm and then location of the critical section has moved towards the upstream side from 8.4 to 6.0 cm, 8.6 to 6.1 cm, 6.3 cm for 6 Ls^{-1} discharge under free flow, 60 per cent, 75 per cent submergence conditions due to increased the contact surface and friction and not found for 90 per cent submergence levels for all the four weirs.

■ **KEY WORDS** : Hydraulic flume, Semi-circular crested weirs, Characteristics of semi-circular weirs, Open channels, Point gauge, Critical depth, Crest height, Discharges

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