

Effect of Height and Surface Roughness of a Broad Crested Weir on the Discharge Coefficient: Experimental Study

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Abstract

Weir is usually incorporated as control or regulation devices in hydraulic systems, with flow measurement as their secondary. It is normally intended for use in the field and thus to regulate broad discharges. Broad-Crested weir is among the oldest common weir types. In this paper, the effect of height and surface roughness for different Board Crested weirs models were studied on discharge coefficient (C_d) in a horizontal open channel. In the crest of the weir, certain materials may be combined with concrete (e.g., boulders) or may be used as cladding to minimize the effect of water overflow (e.g. stone). The weir surface should not be considered smooth in this case, and the discharge coefficient (C_d) must be re-estimated. For these purposes, laboratory flume was used to study the effect of height and surface roughness on the discharge coefficients with four of the different weir models dimensions of the concrete blocks. In this study, the flow conditions were considered to be free water flow and the viscosity effect was neglected. In all cases, the weir height effect was directly proportional to the discharge coefficient while the surface roughness effect was found to be inversely proportional to the coefficient C_d of the case study.