



Development and Analysis of Flow Characteristics of Mini Sharp Crested Weir for Energy Conservation

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Abstract: Study was conducted on three weirs of each 15 cm crest height with upstream bed reduction of 30°, 45° and 60° up to 10 cm height were installed individually under each test run in the hydraulic flume permanent set up and the water surface profiles for each case were drawn, to determine the flow characteristics which include critical depth (minimum specific energy), location of critical depth and to compute froude number for different discharges under free flow conditions. Under each test run, the results indicated that the location of critical depth for all weirs at different discharges is away from the weir. Coefficient of discharge varied from 0.16-0.93 as per decrease in discharge levels, froude number obtained indicates the jump is an undular jump ($F_r = 1-1.7$) for 20, 15 and 10 l/s and oscillating jump for 5 l/s ($F_r = 2.5-4.5$) and energy loss attained more for 5 l/s (exceeded 2.0 cm) as compared to other discharges (within 0.5 cm). Out of the three geometries tested for the weirs, 15 cm crest height with 30° reduced sharp crested rectangular weir performed better in terms of all parameters including cost of design which will enable a significant contribution while installation of water measurement in small scale irrigation system.

Keywords: Weirs, Sharp crested, Critical depth, Hydraulic flume and rectangular weir
