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## EXPERIMENTAL INVESTIGATION OF CRITICAL FLOW AND ENERGY DISSIPATION IN BROAD CRESTED WEIR

E. E. NYAH<sup>1</sup>; E. G. EWAH<sup>2</sup>; S. E. UBI<sup>3</sup>; J. G. EGBE<sup>4</sup>; O. O. EWA<sup>5</sup>

<sup>1,2,3,4,5</sup>Civil Engineering Department, Cross River University of Technology, Calabar, Nigeria

### Abstract

This paper experimentally investigates critical flow and energy dissipation in broad crested weir. The experiments were carried out on the horizontal open channel provided in the fluid mechanics/hydraulic laboratory of the Cross River University of Technology, Calabar-Nigeria. The experiment results obtained show that there was flow continuity since the discharge through any point of the channel is uniform. Critical flow will occur over a weir as far as there is flow continuity and the flow rate is great enough to ensure that  $\frac{y_o}{y_c}$  ratio  $\geq 1$  in order to create and maintain the upstream subcritical flow and critical overflow conditions. Irrespective of critical overflow discharge rate and critical depth  $y_c$  value, the energy head loss due to overflow is constant circa 0.075m for this weir. Also, irrespective of overflow discharge rate,  $\frac{y_o}{y_c}$  ratio is constant and  $y_o = \frac{3}{2}y_c$ . Froude number is a function of discharge and increases as discharge increases. Upstream of weir, the Froude numbers range from 0.075 to 0.103 ( $0.075 < F_{r1} < 0.103$ ) showing that the flows were subcritical. The weir overflow Froude number was unity ( $F_{r2}=1$ ) showing that the flows were critical.

**Keywords:** Open Channel, Weir, Critical Flow, Critical Depth, Froude Number, Specific Energy.

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