Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 6, No. 5, May, 2020

The Effects of Different Shaped Baffle Blocks on the Energy Dissipation

Nassrin Jassim Hussien Al-Mansori [a*], Thair Jabbar Mizhir Alfatlawi [b], Khalid S. Hashim [c], Laith S. Al-Zubaidi [d]

[a] *Department of Environment Engineering, University of Babylon, Babylon, Iraq.*

[b] *Department of Civil Engineering, University of Babylon, Babylon, Iraq.*

[c] *Department of Civil Engineering, Liverpool John Moores University, Liverpool, United Kingdom.*

[d] *Ministry of Industry and Minerals, Iraq.*

Received 03 December 2019; Accepted 17 March 2020

Abstract

Stilling basins can be defined as energy dissipaters constructed of the irrigation systems. This study aims at investigating the performance of the new seven baffle blocks design in terms of reducing the dimensions of stilling basins in irrigation systems. In order to assess the hydraulic efficiency of a new model for baffle block used in stilling basins, a Naval Research Laboratory (NRL) has conducted. The results of this study demonstrate that the performance of the new baffle block, in term of hydraulic jump length reduction and hydraulic energy dissipation, it's better than standard blocks. However, the ratios of the drag resistance attributed to the new baffles block (F_B / F_2) have been larger than that applied on the normal block. It was found that the new block dissipates the energy by 9.31% more than the concrete block, and decreases the length of the hydraulic jump by 38.6% in comparison with the standard blocks. However, the new block maximizes the drag force ratio by 98.6% in comparison with the standard baffle blocks. The findings indicated that in terms of energy reduction and dissipation in the length of the hydraulic jump, the new block is superior to the other kinds.

Keywords: Baffle Blocks; Stilling Basins; Energy Dissipation; Spillway; Hydraulic Jump.

1. Introduction

Stilling basins can be defined as energy dissipaters constructed downstream of the irrigation systems (such as chutes and spillways). The dimensions of these dissipaters mainly depend on the hydraulic jump characteristics. Normally, the stilling basins have large dimensions, which means they require large areas and the construction costs are high. For example, Samadi-Boroujeni et al. (2013) investigated the characteristics of hydraulic jump in a rectangular cross-section flume over six triangular corrugated beds. Results showed that the folded bed influenced the conjugate depths of the hop and the water-powered hop length to be reduced by 25% and 54.7% separately [1]. The creators showed that the amazed beds were superior to the separated ones as far as diminishing the sequent profundities and length of bounce. As of late, the idea of astound squares has been utilized in cutting edge water treatment units to blend water and disseminate the unreasonable vitality [2-5].

* Corresponding author: nassrin20052001@yahoo.com

http://dx.doi.org/10.28991/cej-2020-03091521