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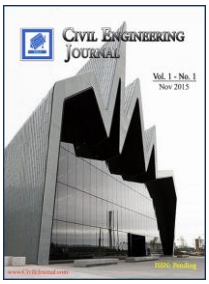

# Simulation of Flow Suspended Load in Weirs by Using Flow3D Model

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**Abstract**

Sharp-crested weir and side-channel weirs can be considered among the control and flow-measuring structures which are greatly applicable in channels, dam spillways and other hydraulic structures. Discharge coefficient in these two types of weirs is affected by the structural geometry and the hydraulics of the flow. Suspended load is one of the main factors which may affect the hydraulics of the flow and consequently modify the flow discharge coefficient. Using different geometrical and hydraulic conditions, the discharge coefficient relation in sharp-crested and side channel weirs for the case of suspended load can be extracted. Flow3D numerical model is capable of precisely simulation the flow containing suspended and bed load in the main channel. The discharge coefficient equation is deduced and presented based on the Froude number, by numerical iterations. The numerical results reveal that the discharge coefficient in the two cases of clear water and the flow containing suspended load are totally different. At the same hydraulic load, the discharge coefficient in the case of existing suspended load is greater than the case of clear water; In addition, the discharge coefficient is reduced by increasing the Froude number in all cases with different load concentrations.

*Keywords:* Flow3D, Discharge Coefficient, Side-Channel Weir, Sharp-Crested Weir.

## 1. Introduction

The weir is defined as an obstacle which is put in front of the flow and makes the water to rise at the back side of the weir. Besides being used as precise discharge measuring devices in irrigation channels and laboratory flumes, the sharp crested weirs are applicable in the upstream flow height and volume increase. Since the hydraulic theory relevant to this weir is considered as the main base for designing the other types of weirs, the sharp-crested weirs are considered to be of great importance.

The flow in sharp-crested weirs is two dimensional and the discharge eqanduation is obtained based on the following assumptions:

- The streamlines on the crest are horizontal
- The Energy loss on the weir is ignored
- The pressure on the weir crest is equal to the atmospheric pressure.

According to the above mentioned assumptions, the energy in the cross section 0 and 1 are considered to be equal (Figure 1); and so a relation is obtained between the discharge rate and the static head over the crest.

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