UNIVERSITI TEKNOLOGI MARA
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MEC299

EXPERIMENTAL INVESTIGATION OF FLOW BEHAVIOUR OF OPEN CHANNEL FLOW THROUGH A LINEAR STRAIGHT CONTRACTION

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SEM MARCH AUGUST 2022

ABSTRACT

Water channels are utilized for a assortment of instructive and inquire about purposes counting hydrodynamic and streamlined ponders. In this project, we study the investigation of open channel flow behavior through linear straight contraction. On the test portion, several angles of wall gaps are installed. This will result in a varied water flow for each wall gap. This method we can use in the weirs to slow down the flow of water so that we can minimize the velocity of movement for the fluid. A weir is a small dam that spans a body of water like a river and is able to control flood problems. This objective is to determine the shape and velocity of the water flow. The application used in this experiment is Circulation Water Channel (CWC). The material of the test section is made from transparent acrylic cover. The expected result is that a larger wall gap will reduce water flow velocity. The water flow rate will be influenced by the angle of the wall gap. The larger the angle used, the water flow rate will decrease. At the same time, the resulting water patterns may also be different.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Water channels are utilized for a assortment of instructive and inquire about purposes counting hydrodynamic and streamlined ponders. The plan, development, and operation of such offices include various building challenges that make it a well-suited choice for an undergrad capstone venture whose accentuation is on multidisciplinary designing capabilities, uncovering to investigate, and learning and applying state-of-the-art strategies. (Panah & Barakati, 2017)

A shift from a relatively narrow upstream channel portion to a wide downstream channel section is known as open channel flow expansion. This channel transition is an important component in various hydraulic systems. Flow deceleration causes an increase in water pressure, which causes flow separation and turbulent eddy motions under steady flow circumstances. These turbulent eddy motions might last for miles downstream of the transition. This will cause unexpected energy loss and erosion in the walls. The flow characteristics of open channel expansion are predicted using Computational Fluid Dynamics (CFD). After they have been thoroughly validated, these numerical methods are chosen over experimental methods due to their lower time demand and lower cost. The CFD solution is validated by experimental results in this investigation. (Muhaisen, 2016)

Besides, open-channel flows are broadly spread. Commonplace illustrations incorporate streams and canals, waste channels, canals, water rides at entertainment parks or sewerage. The driving drive of this ordinarily turbulent stream is gravity. Open-channel streams are characterised by their free surface. Compared to pipe streams, open-channel streams have one more degree of flexibility as a result of the free surface. (Local, n.d.)

1.2 Problem Statements

This work has some problems. Different barriers to water flow will affect fluid movement. This problem is usually related to coastal areas because of the frequent occurrence of soil erosion due to large waves. This reduces the crowds to breathing fresh air on the beach. Therefore, we use a weir that serves as a flow controller.

However, the study of this project was carried out by placing the wall slits at different angles. The resulting flow shape after the gap in place will also be observed.