

# Flow Characteristics through Conduit Using Laser Technique

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## **ABSTRACT**

In this paper, an experimental investigation was carried out to study the turbulent structure and flow characteristics; and to investigate the characteristics of the hydraulic jump occurring in a sloping and adversely sloping rectangular conduit (culvert) with pressurized flow downstream from the jump and a submerged culvert outlet using Laser technique. Experiments were conducted to study the variation of the relative tail water depth with the main parameters affecting the jump. These parameters include the initial Froude number, bottom slope, and ratio of the initial depth to conduit height. To study the turbulence structure, measurements were carried out of the turbulence intensities and turbulence shear stress. Non-dimensional design curves are provided to relate the jump characteristics. The maximum vertical velocity in the re-circulating zone for all jumps is about 7% of initial velocity. Also, the results show that the maximum stream wise velocity near the center plane was smaller than that near the side wall. The turbulence shear stress near the center about (30-42) % higher than that near the side wall. After the jump, the flow will recover into a two dimensional flow.

**KEY WORDS:** *Turbulence structure- Turbulence shear stress-Flow characteristics-Laser technique-Sloping culvert -Adversely sloping culvert -Hydraulic jump-Initial Froude number.*