

عنوان مقاله:

Effect of Upstream Sedimentation on Hydraulic performance of Cylindrical Weirs Under Free and Submerged Conditions

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خلاصه مقاله:

This study experimentally investigated the effect of surface roughness of cylindrical weirs and upstream sedimentation on discharge coefficient (C_{dw}), pressure distribution, and energy loss under free and submerged overflow conditions. The tests were carried out for a non-sedimentation upstream channel bed and sedimentation levels of $2/3$ of the weir height (P). Three different weir diameters and four degrees of weir surface roughness were used with a broad range of flow discharge. The comparison of C_{dw} of weirs indicated that C_{dw} can be reduced by 8 percent with the increase in the surface roughness from almost 0 to 4.5 mm height. Moreover, C_{dw} was increased up to 4 percent with the increase in the upstream sedimentation level to $2/3P$. In addition, C_{dw} was reduced by 3-7 percent with the increase in roughness to 4.5 mm at the upstream sedimentation level of $2/3P$. C_{dw} was also increased up to 5 percent and the energy loss was decreased to 15 percent as the weir diameter was increased from 0.15 to 0.25 m. It was found that, in all the studied weirs, the energy loss was increased up to 14 percent with the increase in surface roughness, whereas it was reduced by approximately 22 percent with the increase in the upstream sedimentation level to $2/3P$. The comparison of the results showed that the pressure variation along the weir at the sedimentation level of $2/3P$ followed a similar trend to that obtained under non-sedimentation level conditions. However, the magnitude of pressure was reduced with the increase in the upstream sedimentation level. In addition, the effect of roughness on the pressure distribution over the weirs was greater at the downstream face than at the upstream face.

کلمات کلیدی:

Cylindrical weirs, Discharge coefficient of weir, Energy loss, LST, Pressure distribution, Upstream sedimentation

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