



Discharge Estimation for check Dam with Cross-sectional Spillway

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The check dam is usually used to deposit the sediment for the stabilization of riverbed and reduction of soil erosion in the upper river reach of a watershed. The traditional check dams are built by concrete and the height of dams is over 3 meters commonly for enhancing the capability of keeping sediment. As a result, it is a destruction of river habitat and ecosystem. With environmental consciousness rising, the check dams design often adopt as cross-sectional spillway. It facilitates the migration of fish and shrimp. In Taiwan, the designing reference book, Handbook of Soil and Water Conservation, are using rectangle and trapezoidal sharp-crested weir formulas to estimate the discharge of the spillway of check dam, and it is no longer suited to nowadays. The formulas in the handbook are derived for sharp-crested weir, and it is apparently different with the one in the field. Besides, the measuring point of the flow depth in this formula changes with discharge, and the field depth measuring section for weir flow formula seems quite fuzzy to apply. For this purpose, different check dam models with cross-sectional spillway is tested in a laboratory flume of 17.0 m length \times 0.5 m width \times 0.60 m depth for a wide range of discharges. Theoretical discharge relations for compound cross-sections are established by linearly combining the flow discharge relations of rectangular and trapezoidal. The applicability of the formula for the flow of the overflow dam and the measuring position of the water depth parameter are discussed. Through the experimental results, the appropriate correction formula is proposed to provide the basis for the subsequent design of the check dam.