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عنوان مقاله:

Effective parameters for calculating the discharge of spillway with radial gates at large dams

محل انتشار:

چهارمین کنفرانس بین‌المللی رفتار بلندمدت و فن‌آوری‌های نوسازی سازگار با محیط زیست سدها (سال: 1396)

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خلاصه مقاله:

In addition to the use of spillways with radial gate with a short height at regulating dams, they are used in the body of large reservoir dams and at the lower levels for flushing the sediments or regulating the flow at the outlet. At the earth and rockfill dams, the spillway is not a part of the dam and it is provided on either of the banks of the river which results in an oblique approach flow to the spillway that likely to affect the discharge capacity of the spillway. Accordingly, in each case, the parameters affecting the discharge of gated spillway are different. Studies on the determination of the discharge of spillways with radial gates are limited to three categories: USACE (1977), USBR (1973) and Sinniger and Hager (1989). There are some complexities for estimation the discharge of spillways with radial gates, which need further studies in this field (The difference in base form of the variation of the discharge with upstream head, providing the earlier methods based on limited experimental and field verifications, the complexity of determining the required parameters for estimation the discharge in USACE (1977), ignoring the effect of gate seat location on the discharge of gated spillways in USBR (1973) and Sinniger and Hager (1989), ambiguity in accuracy of the proposed method for estimating the discharge of gated spillway for its application as the flood discharge systems in large dams). Also, there is insufficient information about the capability of proposed equations under transition flow between orifice and non-orifice conditions. This paper presents an investigation about the ability of different methods in estimating the discharge of the spillway with radial gates. For this goal, 912 data series were collected from some experimental observations on the physical models which constructed from seventeen flood discharge systems in Iranian large dams. In addition to dimensional analysis of effective parameters on the discharge of gated spillway, new relations were established for the simple determination of gate opening and gate lip angle, in contrast to the sophisticated approach used in the USACE (1977) method. In addition to assessing the effects of different parameters on the discharge of gated spillways based on F-test, a new dimensional equation was proposed for estimating the discharge of gated spillways in relation to the most important parameters. Based on all experimental data, the Mean Absolute Relative Errors (MARE) for discharge estimation from USACE (1977), USBR (1973), Sinniger and Hager (1989) and new proposed equation are 6 ... .

کلمات کلیدی:
Discharge, Flood Discharge System, Gated Spillway, Large Dams, Physical Modelling

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