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与宽尾墩联合使用的阶梯溢流面水流掺气问题研究

Aeration of skimming flow on stepped spillway combined with flaring gate piers

中文关键词:阶梯溢流 宽尾墩 滑行流 掺气坎 掺气浓度

英文关键词:stepped spillway flaring gate piers skimming flow aeration bucket air concentration

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中文摘要:

通过模型试验、原体观测资料的分析发现，与宽尾墩联合使用的阶梯式消能工，为了满足溢流面水流掺气减蚀的要求，须使阶梯溢流面在初始段6～8个台阶形成空腔溢流，而阶梯堰面形成空腔溢流与阶梯起始断面的掺气坎型、坎高及宽尾墩型式有关。台阶高度对阶梯溢流面大单宽过流掺气浓度沿程变化影响很小，掺气浓发随阶梯溢流面坡比的变化比较明显，坡度越缓，沿程衰减越明显；掺气浓度随堰上水头的增加而增大；堰面使用Y型宽尾墩掺气量最大，无墩时最小，使用X墩时，处于二者之间。与宽尾墩联合使用的阶梯溢流面大单宽过流掺气量可以满足减蚀需要，而无

英文摘要:

The aeration characteristics of skimming flow on stepped spillway combined with flaring gate piers were studied by model test and analysis on prototype observation data. It is found that in order to mitigate cavitation damage possibly happened to the surface of stepped spillway, the first 6 to 8 steps must be designed to form the aerated flow with cavity. The aeration of flow relates to the type and height of the bucket for generating the aerated overflow at the top of spillway and the type of flaring gate piers. The influence of step height on air concentration is negligible. The slop of stepped chute remarkably affects the air concentration of flow. The steeper the slope, the more rapidly reduced air concentration will be. The air concentration increases with the increase of discharge per unit width. The air concentration of overflow on stepped spillway combined with Y type flaring gate piers is the highest, and that of overflow on stepped spillway combined with X type flaring is lower. The lowest occur to the stepped spillway without flaring gate pier. The air concentration in overflow of stepped spillway combined with Y type or X type flaring gate piers can meet the requirement for preventing the occurrence of cavitation.

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