

Transitions between Uncontrolled Submerged and Uncontrolled Free in Low-Head Ogee Spillway

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Abstract

Low head, ogee spillways is popularly used to defense against floods as well as to provide water for irrigation. Spillway is also used to assess compliance with water quality regulations by controlling amount of discharge to the downstream of a channel. For the purpose of water resource management and/or environmental aspects as explained above, the flow discharge through spillways need to be correctly rated as a function of geometry and hydraulic variables. Typically, four flow conditions are encountered during the operation of spillway: (a) uncontrolled free flow (UF); (b) uncontrolled submerged flow (US); controlled free flow (CF); and controlled submerged flow (CS), and each condition has a unique rating equation. However, one of the tricky part of the spillway operation is finding correct flow type over the spillway because structures can operate under both submerged and free flow conditions, and the types are continuously changing over time depending on the amount of discharge, head water and tail water elevation. Quite obviously, if the wrong rating curve relationship is applied because of misjudgment of the flow type due to a transition, a serious error can occur. Thus, an hydraulic model study of one of spillway structure located in South Florida was conducted for the purpose of developing transition relationships. In this presentation, US to UF transition is highlighted.

Keywords : Spillway, Transition, Uncontrolled submerged flow, Uncontrolled Free flow

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