AOGS 2006

A Study on Surge Induced by Turbidity Current

YONG-JUN LIN[1], JIHN-SUNG LAI[2], CHO-CHUN CHAO[2], FENG-TSO LEE[2], TZ-JIE LIN[3]

[1] *Taiwan International Institute For Water Education*

[2] *Hydortech Institute of National Taiwan University*

[3] *Department of Civil Engineering of National Taiwan University*

Most of the turbidity currents occurring in reservoirs are of underflow type. The origin of this kind turbidity current relies on the density difference between fine sediment solution and clear water. When the turbidity current reaches the toe of the dam, it is blocked by the dam and uplifts along the sides of the dam. When the vertical inertia force balances with friction and gravity of the turbidity, it reaches its peak and starts to form a positive surge propagating to the upstream. The surge velocity is the main factor controlling the time of forming a muddy lake. In order to investigate the phenomenon, a flume experiment is conducted. The factors working on the height and velocity of the surge include the inflow discharge, inflow sediment concentration, slope, fluid properties, angle of dam toe and etc. In this study, three different angles of dam toe (90°, 45°, and 21.8°) were applied for investigations with dyed-salt water. By using the π theorem, the velocity of the surge of the turbidity current is related to Richardson number (Rn), the relative height at toe of the dam (h0/h1), and the relative displacement traveled by the surge (X0/h1), and the angle of dam toe(α). According to the regression equation provided in this study, it may be used for estimating the time needed to turn a clear water reservoir into a muddy one.