

Chairat Seeduang 2014: Irrigation Structure Calibration by Computational Fluid Dynamics (CFD).
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Department of Water Resources Engineering. Thesis Advisor:
Associate Professor Chaiwat Kayankarnavy, M.Eng. 118 pages.

The lower efficiency of irrigation structure has effect to the overall of water management. Flow of irrigation system is submerged flow. Moreover, the irrigation structure calibration in the past requires many men, lots of vehicles, much time, and high cost. This study used measured discharge field data for calibration in physical model, Computational Fluid Dynamic (CFD) model of Kokathiam Regulator (Radial Gate) and Verification model. The results were very accurate (1.91%). Can be apply Computational Fluid Dynamic (CFD) model for Phranarayana Regulator (Sluice Gate). The results were very accurate (1.75%). Used Computational Fluid Dynamic (CFD) model calculate the discharge of various situations. Then, a graph of correlation between h_s/G_0 and C_s of Submerged flow equation ($Q = C_s L h_s \sqrt{2g\Delta H}$). Summary can be using Computational Fluid Dynamic (CFD) model for structure calibration, which can reduce numbers of discharge measurement in the field in order to save time and costs.

In this study, the principle of hydraulic flow calculation, called Computation Fluid Dynamics or CFD, was applied. The CFD has functioned as a loop configuration toward the designated values, which are the daily water levels measured by Royal Irrigation Department of Thailand. The program was set initially, and then the automation analysis showed flow patterns through irrigation structures in three dimensions including the numerical process. Two programs were used in this study, consisting of Gambit and Fluent. Gambit is the program that calculates grid process, while Fluent is the computational program that calculates fluid flows both of laminar and turbulent patterns.

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