EFFECTS OF FLOW AND SEDIMENT DISCHARGE ON LOCAL SCOUR AROUND CYLINDRICAL PIER AT CHANNEL BEND

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Thesis submitted in fulfillment of the requirements for the degree of Master of Science

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CONFIRMATION BY PANEL OF EXAMINERS

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ABSTRACT

Local scour around bridge piers has been explored extensively in the laboratory. There are many parameters that affect the magnitude of local scour depth at piers such as velocity of the approach flow, depth of flow, width of pier, size and gradation of bed material and others. Therefore, this study aims to establish the relationship between the effects of flow and sediment discharge on local scour around cylindrical pier at channel bend. Large physical scale of channel bend was constructed with total area of 6 m width x 7 m length with a 2.25 m radius of curvature (R), 0.9 m channel width (W), radius over width (R/W) ration of 2.5 and 180 degree of bend angle together with relocatable radial measuring equipment to measure local scour depth. The model was filled with 200 mm thick layer of sand with D50 = 0.84 mm. A total of 12 sets of experiments using different flow and sediment matrix and flow without sediment released were carried out. Four scour estimation equations has been selected for evaluation. They are Shen et al. (1969), Coleman (1971), Hancu (1971) and Ab. Ghani and Nalluri (b) (1996). From analysis Hancu (1971) yields the best results with 98 percent accuracy followed by the new modified Ab. Ghani and Nalluri (b) equation with 77 percent accuracy. Hancu had used y/b and Fr as the predictors for rate of local scour while Ab. Ghani and Nalluri (b) had use y/b, b/d and \( \frac{Q}{by\sqrt{gy}} \) as their predictors for rate of local scour.
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