

ABSTRACT

The empirical formula to measure the length of hydraulic jump stated by experts is different from one another. In general, the difference in the formula lies in the coefficient value of the hydraulic jump (C_j). The study is to determine the ratio between the coefficient value in the observation (C_j) and the theoretical coefficient value (C_j), to find out the comparison between the length of hydraulic jump in the observation and the theoretical length of hydraulic jump, to find out the flow characteristics, and to find out the effect of hydraulic jump on the length of hydraulic jump. This research was conducted at the Hydraulic Laboratory, Department of Civil Engineering, Faculty of Civil Engineering and Planning, Islamic University of Indonesia, Yogyakarta.

The method used was the experimental method. The parameters observed were the discharge time (t), the height of hydraulic jump upstream (h_1), the height of hydraulic jump downstream (h_2) and the length of hydraulic jump (L_j). Two variations of discharge were used in the observation. Gate openings used were 1 cm and 1.3 cm.

The results of this study reveal ten steady jumps with $Fr = 4.5 - 9.0$, two strong jumps with $Fr > 9.0$ and four insulated jumps with $Fr = 2.5 - 4.5$, the length of hydraulic jump in the observation has the smallest deviation compared to the length of hydraulic jump in Smetana's theory, the smallest deviation in the length of hydraulic jump in the observation compared to the length of regression hydraulic jump is 0.102%, the length of regression hydraulic jump has the smallest deviation compared to the length of hydraulic jump in Smetana's theory. The coefficient value of the length of hydraulic jump (C_j) during the observation matches the coefficient value of the length of hydraulic jump in USBR theory the best. The change in the height of hydraulic jump downstream compared to the height of hydraulic jump upstream (h_2/h_1) has an effect of 66.9% on the length of hydraulic jump (L_j).

Keywords: length of hydraulic jump, flow characteristics, hydraulic jump coefficient, slide gate.