# DISCHARGE COEFFICIENT OF SIDE-WEIR WITH ZERO HEIGHT IN SUBCRITICAL OPEN-CHANNEL FLOWS

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Water-holding capacity decreased in the urban area because of the rapid urbanization, so that much rain water runs into the river soon. The flood damage may be prevented by the construction of the high levees. Unfortunately, it is almost impossible to construct such high-level levees in all Japanese rivers soon. Recently, the side-weir, which allows a part of floodwater spill from the river to the flood control reservoir which is located under the ground, attracts a great deal of attention, because many costs and times are not necessary to construct the side-weir in comparison with those of the high-level levees.

The spill discharge of the side-weir is predicted by a discharge formula. De Marchi(1934) proposed the discharge formula under the assumption that the friction drag is negligible small and also that the specific energy is constant. The spill discharge formula involves a discharge coefficient. Sabramanya & Awathy(1972) found that the parameters of the discharge coefficients are following four ones, i.e., 1) the inlet Froude number, 2) the ratio between the weir height and inlet flow depth, 3) the ratio between the weir length and channel width and 4) the ratio between the inlet flow depth and weir length from the dimensional analysis. However, systematically experiments, in which four parameters were changed dependently, have not been conducted as yet, because it is quite difficult to change only one parameter under the condition that the other three parameters are kept.

In this study, the experiments were conducted under the condition that three parameters, such as the inlet Froude number, the ratio between the inlet flow depth and the weir length and the ratio between the weir length and channel width were changed, respectively, in the zero-height side-weir channel flows.

It was found that the effect of $h_1/L$ on the discharge coefficient is negligible small in compared with that of $Fr_1$ and $L/B$, so that the effective parameters of the side-weir with zero height are $Fr_1$, $L/B$ and $S/h_1$. As a result, a new formula of discharge coefficients in subcritical open-channel flow with side-weir with zero height is proposed as follows (see Fig. 1):

$$C_M = \{-1.33(L/B) + 0.3\}Fr_1 + 0.84(L/B) + 0.19 \qquad (1)$$

A formula of discharge coefficients of the side-weir with finite height will be proposed near future.

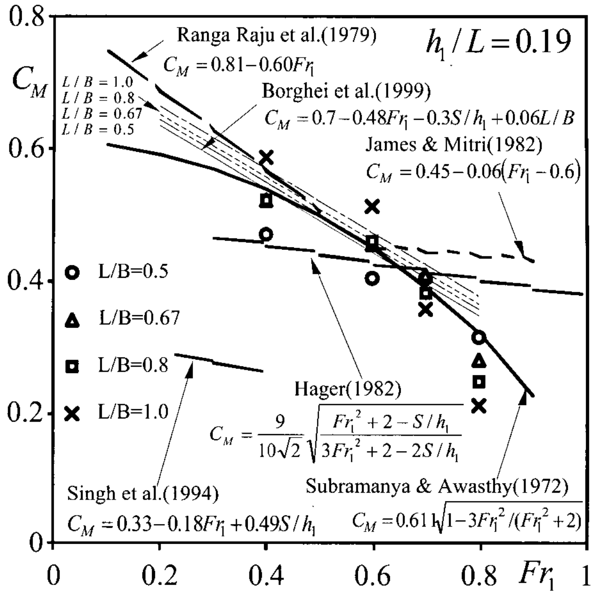


Fig. 1 Relationship between discharge coefficient $C_M$ and inlet Froude number $Fr_1$

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