Study of Hydraulic Function of Standard Wide High Head labyrinth Fuse gate Spillway

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Abstract. One of the effective and economic ways to enhance the capacity of spillway discharge and height maintenance in dam deviations and also to increase the volume of water storage in the reservoirs is to install the fuse gates side-by-side on the dam's spillway crest. This article is accomplishedin line with previous researches, due to the application of fuse gates for the diversion of river water. According to the physical properties of the entire section and hydrological conditions of the river deviations, the fuse gate of standard Wide High Head (WHH) model is proposed. In order to analyze the variation of discharge coefficient in this spillway, experiments were carried out in a laboratory channel, with the length of 11 meters, width of 0.5 m, and height of 0.6 meters. In this research, the relationship between dimensionless parameters of overflow height and head height (h/P) or Weber number (We) and discharge coefficient was investigated. Results indicate that by increasing the ratio of water height in upstream spillway waterfall to the heel heights, the discharge coefficient decreases and also with the diversion of fuse gate spillway and increase of wide head overflow, this coefficient is increased. Mean while, the range of variations for the discharge coefficient, prior to the diversion of fuse gates was between 0.52-0.6 and after the overturn of fuse gates was between 0.54-0.74. Finding sillustrated that the effect of surface tension, due to the low upstream levels, before the inversion of fuse gate, was not negligible and thus, the results were not accordingly reliable. Therefore, the process was carried on until the accession of Weber number 15.5. Accordingly, the effect of this surface tension was very limited and consequently considered as negligible. Also, after the turnover of fuse gates, the Weber number was increased, falling in the range of 95-182, due to the rise of upstream water height and deduction of surface tension. In fact, it indicates that the effect of Weber number on the wide head overflow in proportion to the fuse gate is very low and accordingly, negligible.

Key words: Spillways, discharge coefficient, fuse gate, diversion, Weber number, dimensionless parameters

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