THE HYDRAULIC CHARACTERISTICS OF ARCH MESH BARRIER-STILLING BASIN

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The arch mesh barrier is an appurtenance situated in the stilling basin, which has better hydraulic characteristics. Several physical hydraulic model investigations have been conducted to evaluate the performance of the arch mesh barrier. The experiments were conducted in a glass flume, which is 12 *m* long and 0.4 *m* wide. A plate gate was established in the flume. The model was made of organic glass. The maximum test discharge rate of the model was 45 *L*/s. The measurement of discharge *Q* was performed by triangular weir and the determination of upstream and downstream water level was carried out by means of point gage. Two different mesh barrier heights *h* and three different mesh barrier void ratios η were used in the tests. After optimizing void ratio η among 0.3, 0.4, and 0.5, η=0.4 was selected. The results of the model tests indicate that the application of arch mesh barrier in the stilling basins can greatly decrease the scale of the energy dissipator at the toe of the dam. Three main parameters, the Froude Number of the contracted section F_r, the height of barrier *h* and the distance from the contracted section *L* were studied.

Based on the experimental date, the resistance coefficient of the barrier was obtained and the momentum equation of arch mesh barrier-stilling basin was solved. In case of proper condition, the forced hydraulic jump appears. Because of the action of the arch, the velocity distribution of the flow passing through the mesh is very different from that of free jump, and the damping ratio is higher than that of free jump. Based on the hydraulic model investigation, the methods of defining the height of barrier *h*, distance *L* and the sequent depth of hydraulic jump in arch mesh barrier stilling basin h_t and designing an arch mesh barrier for hydraulic jump stilling basin are presented in this paper. Compared with the general hydraulic jump stilling basin, the length of the stilling basin decreases about 50% and the depth of it declines about 30%.

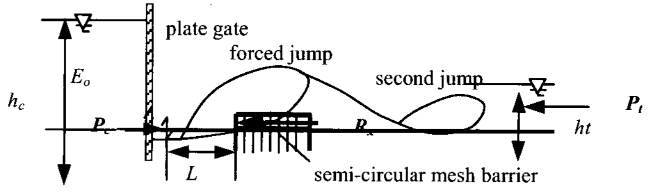

Fig. 1 General layout of the model

Fig. 3 (or Eq.9) illustrates the dependence of h_t/h'' on the parameter ς_1. Photo 1 is the outlet stilling basin of Bayi Reservoir.

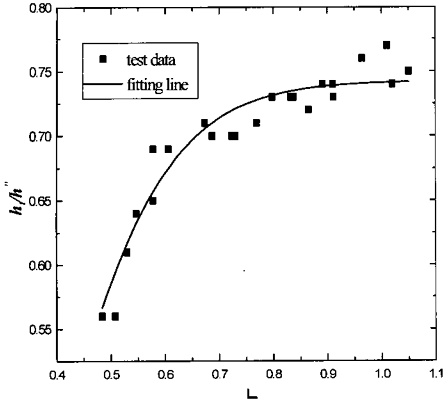

Fig. 3 Dependence of h_t/h'' on ς_1

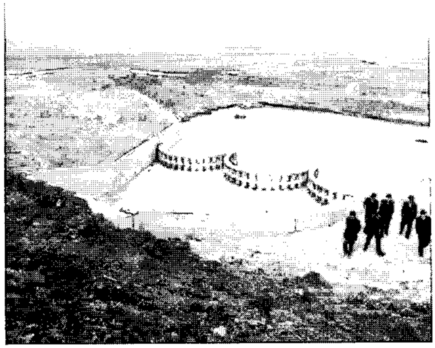

Photo 1. outlet stilling basin of Bayi Reservoir

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