STUDY ON HYDRAULIC CHARATERISTICS OF THE AERATING AND SPLITTING FLOW PIER AND ON ITS APPLICATION IN CHINA FOR OVER TWENTY YEARS

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By means of the theoretical analysis, the prototype test and serial model ones, the structure of the aerating and splitting flow pier and its hydrodynamic characteristics have been researched for over twenty years. It is designed to consist of a semi-cylinder pier nose, a splitting-flow head, a horizontal aerator and a side one. Its action mechanism is that, cut and intensively collided by the pier, the discharge torrent is split into several jets which are made to strongly disturb and spread in longitude and vertical directions and entrain a lot of air, under the condition that air is fully supplied in the back of pier to avoid cavitation erosion. Hydrodynamic characteristics comprise (1) rules on the pier nose, which are the wall pressure distribution along directions of the pier height and water movement, the similarity of the fluctuation pressure amplitude and dominant frequency and the law of cavitation of pier nose and the rule of vibration of the pier body, (2) those on jet aeration in air and flow aeration in a stilling basin, (3) those on the hydrodynamic pressure acting on the floor of a stilling basin and (4) effect of the energy dissipation. The engineering operation and model tests show that this kind of dissipator is of high efficiency, safety and economy in dissipating water energy, aerating flow and protecting cavitation produced by high water head and the large discharge in spillways and overflow dams.