THE USING OF ABRUPT RISE TO CONTROL DOWNSTREAM LEVEL WATER DEPTH ON THE FILA TUKUTAHA SPILLWAY DAM

Nadjadji ANWAR*, Wasis WARDOYO*, Linda PRASETYORINI**

,Civil Departement, Institute of Teknologi Sepuluh Nopember, Surabaya, Indonesia,*

***Water Resources Departement, Brawijaya University, Malang, Indonesia*

E-mail: linda.wre03@gmail.com.

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Abstract

In the recent two decades, many dams have been constructed within Indonesia, to control the flood in addition to make irrigation, water supply, and hydropower. The two key challenges during the spillway design process are conveyance and energy dissipation. Conveyance means the safety transport of large amount of waters from reservoir into the intake or spillout channel on the downstream area. Kinetic energy of water over the spillway must be dissipated in order to prevent severe scouring of downstream riverbed and failure of downstream structures. The chute block and sills with different configurations are used in the stilling basin to disturb water and dissipate large amount water energy through formation of a hydraulic jump. To ensure proper performance and energy dissipation, the basin should be designed to reduce the sequent depth of the hydraulic jump and keep it less than the tailwater depth. This paper presents experimental result about Fila Tukutaha Dam spillway system at Alor District. Stilling basin on the end of chuteway was designed to protect riverbed from scouring by reducing energy over the spillway. Irrigation, water supply, and power plant is the main purpose of building this dam. The dam was constructed with tunnel combination overflow spillway type and stilling basin on the downstream area. The structure of spillway was designed for a 100 years return period flood discharge is 253,80 m^3/s with scale of 1 to 50 in the laboratory. According to the hydraulic calculation results, a standard Type III stilling basin was designed for a Froude number of 6 with incoming depth 1,65 m (0,5 ft). The stilling basin of 28,00m with U.S. Berau Reclamation (USBR) Type III length was arranged in the downstream of chute way.Several parameters such as water level, velocity, and froude number were calculated by theoritical analysis and measured on the laboratory with scale modele. The abrupt rise with several variety slopes were conducted in the end of endsill to complete stilling basin's design. The highest efficiency was produced by abrupt rise with a slope 1:1.