

Genetic Algorithm Methods for Determination Over Flow Coefficient of Medium Throat Length Morning Glory Spillway Equipped Crest Vortex Breakers

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Abstract : Shaft spillways are circling spillways used generally for emptying unexpected floods on earth and concrete dams. There are different types of shaft spillways: Stepped and Smooth spillways. Stepped spillways pass more flow discharges through themselves in comparison to smooth spillways. Therefore, awareness of flow behavior of these spillways helps using them better and more efficiently. Moreover, using vortex breaker has great effect on passing flow through shaft spillway. In order to use more efficiently, the risk of flow pressure decreases to less than fluid vapor pressure, called cavitations, should be prevented as far as possible. At this research, it has been tried to study different behavior of spillway with different vortex shapes on spillway crest on flow. From the viewpoint of the effects of flow regime changes on spillway, changes of step dimensions, and the change of type of discharge will be studied effectively. Therefore, two spillway models with three different vortex breakers and three arrangements have been used to assess the hydraulic characteristics of flow. With regard to the inlet discharge to spillway, the parameters of pressure and flow velocity on spillway surface have been measured at several points and after each run. Using these kinds of information leads us to create better design criteria of spillway profile. To achieve these purposes, optimization has important role and genetic algorithm are utilized to study the emptying discharge. As a result, it turned out that the best type of spillway with maximum discharge coefficient is smooth spillway with ogee shapes as vortex breaker and 3 number as arrangement. Besides it has been concluded that the genetic algorithm can be used to optimize the results.

Keywords : shaft spillway, vortex breaker, flow, genetic algorithm

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020