Contribution at Dimensioning of the Energy Dissipation Basin

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Abstract : The environmental risks of a dam and particularly the security in the Valley downstream of it,, is a very complex problem. Integrated management and risk-sharing become more and more indispensable. The definition of "vulnerability "concept can provide assistance to controlling the efficiency of protective measures and the characterization of each valley relatively to the floods's risk. Security can be enhanced through the integrated land management. The social sciences may be associated to the operational systems of civil protection, in particular warning networks. The passage of extreme floods in the site of the dam causes the rupture of this structure and important damages downstream the dam. The river bed could be damaged by erosion if it is not well protected. Also, we may encounter some scouring and flooding problems in the downstream area of the dam. Therefore, the protection of the dam is crucial. It must have an energy dissipator in a specific place. The basin of dissipation plays a very important role for the security of the dam and the protection of the environment against floods downstream the dam. It allows to dissipate the potential energy created by the dam with the passage of the extreme flood on the weir and regularize in a natural manner and with more security the discharge or elevation of the water plan on the crest of the weir, also it permits to reduce the speed of the flow downstream the dam, in order to obtain an identical speed to the river bed. The problem of the dimensioning of a classic dissipation basin is in the determination of the necessary parameters for the dimensioning of this structure. This communication presents a simple graphical method, that is fast and complete, and a methodology which determines the main features of the hydraulic jump, necessary parameters for sizing the classic dissipation basin. This graphical method takes into account the constraints imposed by the reality of the terrain or the practice such as the one related to the topography of the site, the preservation of the environment equilibrium and the technical and economic side.This methodology is to impose the loss of head DH dissipated by the hydraulic jump as a hypothesis (free design) to determine all the others parameters of classical dissipation basin. We can impose the loss of head DH dissipated by the hydraulic jump that is equal to a selected value or to a certain percentage of the upstream total head created by the dam. With the parameter DH+ =(DH/k),(k: critical depth),the elaborate graphical representation allows to find the other parameters, the multiplication of these parameters by k gives the main characteristics of the hydraulic jump, necessary parameters for the dimensioning of classic dissipation basin.This solution is often preferred for sizing the dissipation basins of small concrete dams. The results verification and their comparison to practical data, confirm the validity and reliability of the elaborate graphical method.

Keywords : dimensioning, energy dissipation basin, hydraulic jump, protection of the environment

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