RESEARCH ON SAFETY EVALUATION METHOD OF CONCRETE HIGH ARCH DAM BASED ON UNCERTAINTY AND STOCHASTIC ANALYSIS

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ABSTRACT

The present mainly adopted concrete high arch dam deterministic safety evaluation generally involves choosing most unfavorable load combination as the deterministic load exerted on the deterministic structure of constant resistance of materials and drawing an "either-or" deterministic evaluation conclusion through analysis and calculation and in view of strength & stiffness condition, and thus has such weakness as taking no account of the randomness of the load and resistance and the fuzziness of the evaluation criterion as well as lacking risk analysis[1]. Before the actual occurrence, no one can definitely tell the time and way of the occurrence of the possible factors causing high arch dam failure, such as flood, earthquake, landslide, abnormal temperature variation, upstream dam collapse, war, terrorism attack, etc. The load of high arch dam is of randomness ; the non-uniformity in the material strength of the high arch dam body and the significant strength difference of the rock dam foundation contribute to the existence of uncertainty; such phenomena as water etching, seepage, alkalization, aging and fluidification further lead to the change with the time in terms of the strength of the dam body and rock dam foundation material, hence the randomness and uncertainty of the resistance of high arch dam[2]. There is no definite dividing line between the safety and the lack of safety of high arch dam and the evaluation criterion reflecting the fuzziness of the evaluation conclusion is required. Risk analysis is applicable to research on the failure of high arch dam whose load and resistance is of randomicity and uncertainty; risk rate reflects the degree of the failure possibility of the high arch dam; economic loss risk value and life loss risk value combine to reflect the failure possibility and the calamity

consequence[3]. A high arch dam risk evaluation system is established based on the risk rate, the economic loss risk value and the life loss risk value; a study is made of the method of calculating the risk rate, the economic loss risk value and the life loss risk value; an approach is made of the principle for determining the tolerable risk in China and other developing countries[4]; a preliminary evaluation is made on risk of the highest arch dam in the world ---- Jinping High Arch Dam[5].

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