

# Reliability analysis of a concrete gravity dam

## Contribution for discussion on Theme D: Risk Analysis-assessment of reliability for concrete dams

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**ABSTRACT:** Recent efforts to develop guidelines and regulations for design and assessment of concrete dams from a probabilistic point of view lead to the development of a Probabilistic Model Code for Concrete Dams (PMCD). This work follows an increasingly interest on the potentialities of probabilistic-based decisions regarding dam operation, maintenance and safety assessment. Several working groups have been deepened knowledge on this subject leading to, in some cases, the explicit consideration of risk analysis for the assessment of concrete dam's safety conditions as a support of decision-making processes.

In this work, the methodology framework presented in the PMCD is tested, by estimating the probability of failure of an existing concrete dam. Two failure mechanisms and two loading scenarios are considered, and reliability is quantified at both component and system levels. At a second stage, the dam safety was reassessed considering that the probability density function of the friction coefficient of the concrete-rock interface is updated using the results of two additional shear tests. The results show that these tests lead to a slightly reduction (about 6.5 times) of the probability of failure, for the normal case. Therefore, the continuous collection of new data during the dam operation, particularly associated with those variables which the calculation of the probability of failure is more sensitive to, may improve the confidence of the engineers on the safety analysis results and support the decision-making process regarding the dam operation and maintenance.