"Modelling of concrete dams and rock engineering problems"

J.V.Lemos
LNEC – Laboratório Nacional de Engenharia Civil, Portugal

Abstract

The presentation reviews the most important issues that have to be addressed in the numerical modelling of concrete dams under operating conditions and failure scenarios. Rock engineering problems related to dam foundations and underground structures are also covered. The various issues are discussed with reference to practical examples, mainly taken from LNEC's experience in this field.

Modelling of concrete dams under normal operating conditions presents few computational problems, as it usually relies on the assumption of elastic behaviour, and may be validated by comparison with monitoring data. Failure scenarios pose more difficulties, and testing of physical models still provides valuable information. The various collapse modes of gravity and arch dams are considered, namely those involving the concrete, the concrete-rock interface or the rock mass. Constitutive models employed for the mechanical behaviour of concrete and the discontinuities are discussed, as well as other specific problems, such as the representation of water flow through the foundations and uplift pressures on the structure.

Issues involved in seismic analysis are also examined, namely the dam-reservoir dynamic interaction, the modelling of contraction joints in arch dams, and the assessment of sliding movements along the foundation of gravity dams. The possibilities for model validation by means of experimental data are also discussed.

The foundation is always an area of concern for dam safety, and the capabilities of numerical models in rock mechanics are also addressed, in a concise way, with reference to some problems of rock foundations and underground works.

J.V. Lemos
LNEC
Av. do Brasil, 101
P-1700-066 Lisboa
Portugal

Phone: 351-21-8443369/8443360/8443000
Fax: 351-21-8443026
E-mail: vlemos@lnec.pt