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Nota di contenuto	Fundamentals -- Review of Mechanics -- Science and Art of Finite Element Modeling -- Finite Elements -- Non-Linear Finite Element Analysis -- Transient Dynamic Analysis -- Fracture Mechanics -- Fracture Mechanics of Concrete -- Plasticity -- Embedded Reinforcement -- Elements of Seismicity -- Deconvolution -- non-linear Rock Model -- Alkali Aggregate Reaction; Theory -- Probability and Statistics: Fundamentals -- Uncertainty Quantification: Fundamentals -- Probabilistic and Random F.E.M -- Metamodeling and Machine Learning -- Soil Structure Interaction -- Performance Based Earthquake Engineering -- Material Properties -- Dam Loads -- Alkali Aggregate Reaction; Modeling -- Mathematical Geometric modeling of dams -- Linear Elastic Analyses -- Thermal Analyses -- Computational

Tools for Probabilistic Analyses.

Sommario/riassunto

This self-contained book focuses on the safety assessment of existing structures subjected to multi-hazard scenarios through advanced numerical methods. Whereas the focus is on concrete dams and nuclear containment structures, the presented methodologies can also be applied to other large-scale ones. The authors explains how aging and shaking ultimately lead to cracking, and how these complexities are compounded by their random nature. Nonlinear (static and transient) finite element analysis is hence integrated with both earthquake engineering and probabilistic methods to ultimately derive capacity or fragility curves through a rigorous safety assessment. Expanding its focus beyond design aspects or the state of the practice (i.e., codes), this book is composed of seven sections: Fundamentals: theoretical coverage of solid mechnics, plasticity, fracture mechanics, creep, seismology, dynamic analysis, probability and statistics Damage: that can affect concrete structures, such as cracking of concrete, AAR, chloride ingress, and rebar corrosion, Finite Element: formulation for both linear and nonlinear analysis including stress, heat and fracture mechanics, Engineering Models: for soil/fluid-structure interaction, uncertainty quantification, probablilistic and random finite element analysis, machine learning, performance based earthquake engineering, ground motion intensity measures, seismic hazard analysis, capacity/fragility functions and damage indeces, Applications to dams through potential failure mode analyses, risk-informed decision making, deterministic and probabilistic examples, Applications to nuclear structures through modeling issues, aging management programs, critical review of some analyses, Other applications and case studies: massive RC structures and bridges, detailed assessment of a nuclear containment structure evaluation for license renewal. This book should inspire students, professionals and most importantly regulators to rigorously apply the most up to date scientific methods in the safety assessment of large concrete structures.