Preface

Concrete face rock-fill dams (CFRD) have been widely used in dam construction due to their many advantages, such as local materials, good adaptability to terrain topographic and geological conditions, and fast dam construction speed. In the future, a number of high concrete face rock-fill dams will be built in the Jinsha River, Lancang River, Nu River, Yalong River, Dadu River and the Yarlung Zangbo River in southwest of our country, and their safe construction and operation will become a key issue of widespread concern in water conservancy and hydropower engineering. After more than 30 years of construction and development, our country's face rock-fill dam project has achieved world-renowned results. However, due to the fact that the early construction of face rock-fill dams are mainly based on semi-empirical and semi-theoretical design, and the operation time of the built high concrete rock-fill dams is relatively short, the construction and operation of high face rock-fill dams still face some key technical issues. For example, while several high face rock-fill dams recently built have achieved success and valuable experience, some of these projects have encountered problems such as excessive dam body deformation, face slab extrusion damage, anti-seepage system failure, and significant leakage. In addition, the deformation prediction results of high face rock-fill dams in the design stage often deviate greatly from the measured values during the operation period, and the deformation stabilization time of some high face rock-fill dams is longer than the predicted values, resulting in damage to the dam body or face slab structure during the operation period. The effective solution of these problems will provide important support for the safe construction and operation of high face rock-fill dams projects in the future.

Based on a summary and refinement of existing research findings, this book conducts research on the safety operation analysis and control of high face rock-

fill dams. It draws on the results of recent research projects, such as “Research on the Extrusion Damage Mechanism and Treatment Measures of the face slab Extrusion and Breakage of Tianshengqiao First-class face Rock-fill Dam” and “Research on the Design and Safety Standards and Engineering Measures of the 300m-class High face Rock-fill Dam”, and integrates practical engineering experience through theoretical analysis, numerical calculation, and measured data analysis. The book systematically summarizes the numerical simulation methods for the safe operation characteristics of high face rock-fill dams and realizes the numerical simulation of stress deformation in combination with specific engineering projects. It carries out the analysis of monitoring data and safety evaluation of face rock-fill dams during their operation period. Combined with the investigation and analysis and summary of face slab extrusion and damage problems, the mechanism and countermeasures were studied. The safety control measures of face rock-fill dams are proposed from many aspects, including design, construction and operation management.

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In view of the limited level of the author, there may inevitably be inadequacies and omissions in this book. So readers are kindly requested to offer your valuable comments and suggestions for improvement.

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