

Walter Wittke

Rock Mechanics

Theory and Applications
with Case Histories

Translated by Richard Sykes

In co-operation with Stephan Semprich
and Bertold Plischke

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Preface

For more than 20 years I have been working in the relatively new engineering field of rock mechanics. During my work, my special interest was focussed on the formulation of constitutive laws governing the mechanical and hydraulic behaviour of jointed rock, on their numerical implementation and on the application of this knowledge to rock construction. It is my experience from many years of research, teaching and practising that in this way the load carrying mechanisms in rock construction projects can be better understood, which enables a more efficient design and construction. Following a suggestion made by many interested colleagues, I therefore decided to make the basic principles of the subject and my experience in their application available to colleagues and students in English as well.

This opportunity was used to include experience gained during construction projects in recent years. The German edition was extended by reports on projects like the Estangento-Sallente powerhouse cavern (Spain), built in rock with large horizontal in-situ stresses (Chapter 28), a two-tube road tunnel in Wuppertal, FRG (Chapter 11), the planning and design of the Ernstbach dam project to the west of Wiesbaden, FRG (Chapter 14) as well as an investigation into the failure of the Malpasset dam north of Fréjus, France (Chapter 14).

The inducement for me to work in this interesting field came from my honoured teacher Prof. Dr.-Ing. Dr.h.c. Dr.-Ing.E.h. H. Leussink. Generous support for my research work was granted by the Deutsche Forschungsgemeinschaft (German Research Society). The application of new concepts is not possible without an open-minded attitude on behalf of the parties involved in a project and especially on the part of the client. In this regard, I want to mention among others the Schluchseewerk AG and its former director Prof. Dr.-Ing. Dr.-Ing.E.h. E. Pfisterer †, the high speed railway project group in the Stuttgart regional administration of the Federal Railways, here esp. Ministerialrat Mr. R. Grüter; the Electric Power Company of Cataluna (FECSA) in Barcelona and its director Dr. E. Veiga; the administrative district of Rhineland in Cologne and Dipl.-Ing. Modemann, the Urban Power Company of Wiesbaden and Prof. Dr.-Ing. Hans Blind †.

Important contributions to this book were made by my former candidates for a doctor's degree Dr.-Ings. C. Louis, W. Rodatz, M. Wallner, P. Rißler, S. Semprich, B. Pierau, K. Gell and B. Plischke. Because of his devoted work in his function as chief engineer of my institute, I want to specifically lay stress on the work done by Dr. Semprich. The contributions made by Dr. Plischke to the theoretical foundations should as well be explicitly mentioned. An essential part of the work on the manuscript was done by Dipl.-Ing. J. Rechtern and Dr.-Ing. C. Erichsen, also former chief engineers, as well as Dr.-Ing. J. Kiehl. The work of Dr.-Ings. P.-J. Erban, J. Feiser and W. Krajewski and Dipl.Ings. R. Breder and W. Lange is also appreciated. The painstaking translation was made by Dipl.-Ing. R. Sykes. I want to express my thanks here once again to Ms. E. Haselier, my secretary since many years, and Ms. Ch. Möller-Wiegels. The illustrations in this book were drawn by the chief structural draughtsman of my institute, Mr. A. Evers. I would also like to thank Dipl.-Phys. G. Bosch for the diligent perusal of the English manuscript and the Springer publishing house for the good get-up of this book and the pleasant co-operation.

I want to express my thanks to my mother for her support during my professional career and to my wife and children for showing understanding for my work.

Aachen, March 1990

W. Wittke

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