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FIELD MEASUREMENTS IN GEOMECHANICS

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Swiss Federal Institute of Technology, Zurich

VOLUME 1



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Preface

Field measurements are an indispensable means of safety control of structures in their different stages of construction and during their service life. They also provide a tool for economic design by revealing the actual behaviour of the structure thus permitting the calibration of theoretical models or initial assumptions. In fact, several recent developments in geotechnical practice would be unthinkable without advanced monitoring techniques.

The main objective of this Symposium was to review current techniques of field measurement in geomechanics and to provide a forum for presentation of new developments. Special emphasis was given to the identification of fundamental aspects of instrumentation valid for a number of areas such as soil and rock mechanics and the foundations of large dams. It is probably the first time that field measurement problems associated with radioactive waste disposal were dealt with separately in an international symposium, showing its increasing importance. What are the factors favouring the present-day developments in instrumentation? Undoubtedly the increasing public sensitivity to the safety of important structures and to accident prevention is most important. Such requirements are specially pronounced in the case of large excavations, large dams, off-shore engineering and radioactive waste disposal. Another factor is given by the recognition that even highly sophisticated numerical calculations have their limitations if the underlying models are not calibrated by observations in a quantitative manner. Here we are not thinking only of the accuracy of the input material parameters but rather of the correctness of concepts upon which the simplifications of reality are based. So more and more large scale field monitoring is being carried out aimed at obtaining firm ground for theoretical considerations. A further factor calling for instrumentation comes from the so-called «design as you go» procedure frequently applied in deep tunnels, in mining and even in slope engineering. When the soil or rock conditions cannot be assessed in advance many decisions concerning design and construction must be made as the work proceeds. This does not imply doing things simply by a «trial and error» method because of the clear objectives in monitoring and its continuous evaluation. The last main factor promoting present activities in instrumentation stems from the rapid advances of electronics. In the near future the sensors may become smaller in size, more rugged, probably less sensitive to humidity and to temperature changes and even more precise. We can also anticipate decreasing costs. But also in data processing completely new possibilities are likely to emerge. Readings and data processing will

take place in one operation providing immediate on-site information. This is the case in many instances already today.

An important achievement of the symposium resides in its multidisciplinary character. By the common efforts of the contributors it has been possible to shift from the level of pure measuring technique to an approach with true scientific character. This involves the establishment of a strict methodology and of sound principles of broad validity. Such procedures are well demonstrated by the numerous case histories reported in these proceedings.

The outstanding contribution of Mr. Ch. Amstad and Mr. A. Tisa to the organization of the symposium and to the edition of the proceedings deserves special appreciation and thanks.

January, 1984

K. Kovári

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