

Preface

According to the statistics of engineering safety accidents, among the collapse accidents, the deaths in underground engineering construction account for 32.6 %, and those in pit excavation and retaining wall account for 23.9 %. Even in some developed countries, the deaths in collapse accidents caused by structural defects of traffic engineering account for as high as 11 %. The statistical result shows that the projects with a high-efficiency structural organization have fewer problems, while the projects with a low-efficiency structural organization have more problems; in the latter, the material property and microstructure change, which is not conforming to the conditions of the deformation compatibility theory, so only a reasonable structure shall be selected to meet the structural deformation compatibility control. It means that the deformation compatibility control method to solve the engineering structure stability and balance problems shall be innovated, or the engineering structure will have a big difference between the calculated result and the actual behaviors, and even safety threats will be brought about.

Through exploration of nearly two centuries, the underground engineering construction techniques have been remarkably improved. Now, for underground engineering structures, the traditional loose load theory (similar to the load-structure method) or the numerical analysis method is used for the calculation and analysis; the modern rock bearing theory (similar to the strata-structure method) is mainly used for the reasonable structure construction, construction method, and procedures. Though existing theories or methods imply the assumption of “deformation compatibility control,” it is often ignored in engineering practice. The structural deformation compatibility control issue is emphasized, and the “deformation compatibility control” is taken as the explicit boundary condition, so as to allow the interaction between underground engineering structures and surrounding rock and achieve the “stable equilibrium and deformation compatibility control” status. As for simple geological environments with good surrounding rock, the underground engineering stable equilibrium can be achieved more easily. It only requires mastering physical concepts, and the selection of theories and construction methods does not matter that much. For underground engineering constructions with poor geological conditions and complicated engineering environment, engineering

measures should be taken to guarantee the deformation compatibility control of structure; otherwise, the reasonable transmission or transfer path of force in the structural system will be harmed, and the structural stable equilibrium status may be changed, or even a hazardous equilibrium status may be caused. The underground engineering stable equilibrium theory together with excavation energy control technique, strong pre-reinforcement technique, comprehensive stress-independence technique, and deformation compatibility control technique can effectively solve this kind of problems.

If you have any opinions on any content of the book, please do not hesitate to contact us.

Hangzhou, China
Ningbo, China
Hangzhou, China
Ningbo, China
2016

Hanhua Zhu
Mengchong Chen
Yu Zhao
Fusheng Niu

Stability Assessment for Underground Excavations and
Key Construction Techniques

Zhu, H.; Chen, M.; Zhao, Y.; Niu, F.

2017, XVII, 157 p. 107 illus., Hardcover

ISBN: 978-981-10-3010-9