A General Simple Method for Calculating Consolidation Settlements of Layered Clayey Soils without/with PVDs under Any Staged Loading

Webinar

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ABSTRACT

The HKIE Geotechnical Division and Hong Kong Geotechnical Society are co-organizing a series of webinars delivered by local academics on the latest research in geotechnical engineering. Two webinars will be delivered in March 2022 by professors of The Hong Kong Polytechnic University, and more will follow in the coming months.

In this talk, the speaker will introduce a new general simplified Hypothesis B method for calculating consolidation settlements of layered clayey soils exhibiting creep without or with prefabricated vertical drains (PVDs) under any staged loading including unloading and reloading. He will first explain meanings of consolidation, definition of creep and its mechanisms, and real settlement problems. He will then describe what are Hypothesis A and Hypothesis B methods for calculating consolidation settlements of clayey soils considering creep compression. He will give test evidence or proof that viscous (or incremental creep) compression does occur in the primary consolidation, that is, Hypothesis B is correct and Hypothesis A is incorrect.

After this, he presents a new general simplified Hypothesis B method in a general equation. He will show how to derive a few key mathematical relationships for this method. He will also explain how a single “secondary” consolidation coefficient from a creep test on this soil in a normal consolidation state can be used to calculate creep settlements of the soil in any over-consolidation state and in any unloading/reloading state. Examples and case study will be presented to verify this method by comparing calculated settlements with settlements from fully coupled numerical analyses and measurement. It is found that the new general simple method is accurate and easy to use for calculating consolidation settlements of single or layered soils with and without vertical drains under multi-staged loading, unloading and reloading using parameters from conventional oedometer tests.

THE SPEAKER

Jian-Hua Yin received a BEng degree in 1983 in a university (later merged with Chongqing University) in Chinese Mainland, an MSc degree from Institute of Rock and Soil Mechanics of the Chinese Academy of Sciences in 1984, and a PhD from The University of Manitoba, Canada in 1990. Dr Yin has a mix of industrial and academic experiences. He was PEng in Canada in 1991~1995 and is a member of HKIE. After worked in consulting firms and a research center in Canada and Hong Kong, he joined Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University (PolyU) in 1995 as an Assistant Professor. He has been a Chair Professor of Soil Mechanics of PolyU since 2013. Professor Yin has a good track record in research and has played a leading role in development of advanced soil testing equipment, innovative fiber optical sensors, establishing large-scale multi-purpose physical modeling facilities for studying geo-hazards and soft soils, organization of regional and international conferences. Professor Yin serves

as a Vice-President of International Association for Computer Methods and Advances in Geomechanics (IACMAG), a Co-Editor of International Journal of Geomechanics (ASCE, USA), and a Co-Editor of Geomechanics and Geoengineering (UK). He has received the honours of the prestigious “John Booker Medal” in 2008, “Chandra S. Desai Excellence Award” in 2011, and “Outstanding Contributions Medal” in 2017 from all IACMAG. He received 2000 “Mao Yi-Sheng Soil Mechanics and Foundation Engineering Youth Award” and delivered the high-status 2011 “Huang Wenxi Lecture” in Chinese Mainland. He obtained 2016 Natural Science Award (first-class) (ranked 2nd) and 2019 Natural Science Award by the Ministry of Education of China (second-class) (ranked 1st). Recently a book entitled “Consolidation Analyses of Soils” by Jian-Hua Yin and Guofu Zhu has been published by CRC Press. For more information on the book, see https://www.routledge.com/Consolidation-Analyses-of-Soils/Yin-Zhu/p/book/9780367555320. For more information of Prof Yin, see his homepage: http://www.zn903.com/cejhyin/.

Registration & Enquiries:

This Lecture is free of charge. Please register online via the website at https://hkieged.org/public/events/NTuc5Ltvn1JAvwwlM3Io. Successful applicants will be noticed individually. For enquiries, please contact Dr Andy Leung at andy.yf.leung@polyu.edu.hk.