



Pre-30th GETD AGM Technical Talk on Advancements of Realistic Simulation of Jet Grouting Piles (JGP) and Deep Cement Mixing (DCM) for Ground Improvement Application

by Dr Ng Soon Min

Dr Ng Soon Min is currently a committee member in Geotechnical Engineering Technical Division (GETD).

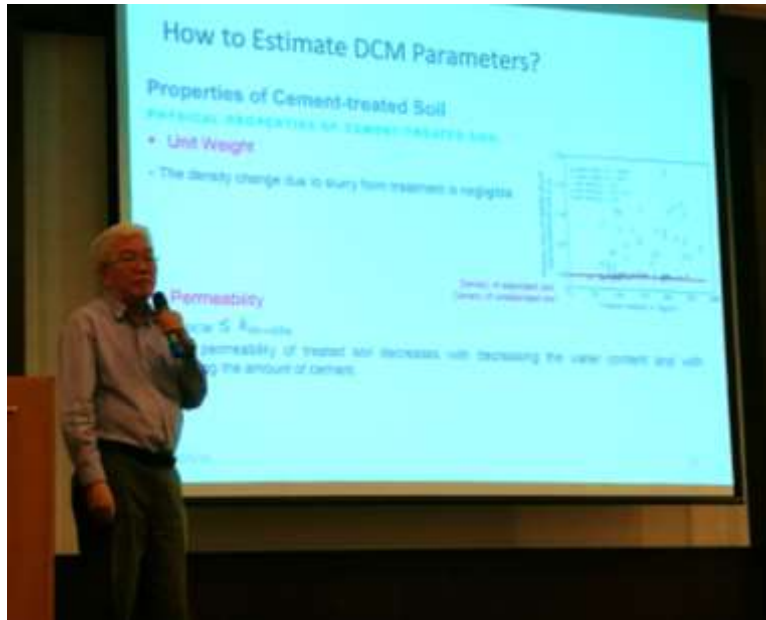
The technical talk on “Advancements of Realistic Simulation of Jet Grouting Piles (JGP) and Deep Cement Mixing (DCM) for Ground Improvement Application” was organised by the Geotechnical Engineering Technical Division (GETD) on 15th June 2019 at the Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, Petaling Jaya, Selangor. The technical talk was organised in conjunction with GETD’s 30th Annual General Meeting (AGM) and was delivered by Professor Harry Tan Siew Ann from the National University of Singapore. A total of 157 participants attended the technical talk.

The speaker commenced the talk by highlighting on the ground condition challenges in Singapore corresponding to the exploitation of underground space for development. In recent years, ground improvement of soft clay sites using cement grouting such as Jet Grouting Piles (JGP) and Deep Cement Mixing (DCM) columns has grown by leaps and bounds. The current design analysis of these applications use the Mohr-Coulomb model (MC) is unable to model the brittle fracture progressive failures. Furthermore, this approach does not allow any tension stresses in the design and often resulted in excessively conservative designs. Therefore, this has resulted in the development of Shot-Crete Model (SCM) in finite element method, enabling the progressive brittle fracture analysis and highly optimal design of JGP/DCM. Prof Tan provided three case studies that showcased the implementation of the SCM.

The first case study was grouted slab in earth retaining stabilizing structure (ERSS) with tension piles for an excavation project in soft soil, where the SCM exhibits the real nature of tension stress development from peak strength to residual values compared to MC. Subsequently, the speaker discussed the influence of geometry in the second case study which is a canal improvement project that utilized the grouted slab inverted arch without tension piles. This design took advantage of the material’s strength by making bulk of the material work in compression. Finally, the third case study showcased a localized failure of DSM columns without tension elements for a waterway project. The finite element model results have demonstrated a flexural failure mode which is consistent with the observation in the field.

Before the end of the talk, Prof Tan opened up a Q & A session to the participants. After active discussion from the floor, an appreciation momento was presented by GETD Chairman Ir Lee Peir Tein to Prof Harry Tan.

The technical talk ended at about 11.00 a.m. with a great round of applause from the floor.



Professor Harry Tan delivering the talk



Appreciation memento presented by the Chairman of GETD, Ir. Lee Pier Tien (left) to Professor Harry Tan (right)