Webinar Series

University Transportation Center for Underground Transportation Infrastructure (UTC-UTI)

Intelligent Systems for Transportation Tunnel Analysis, Design, and Monitoring

Wednesday, April 15, 2020: 12-1:30 PM MST (2-3:30 PM EST)

Free registration: (link)

http://underground.mines.edu/utc-uti.html

A Intelligent Back Analysis of Tunnel Response from Field Monitoring

Back-analysis involves the determination of input parameters in computational models using field monitored data, and they can be particularly useful for the analysis and design of underground constructions. Heuristic methods of back-analysis, which are experience-based techniques for inverse problem solving, are presented. Two heuristic methods are discussed, namely, Simulated Annealing (SA) and Differential Evolution Genetic Algorithm (DEGA). Descriptions of SA and DEGA, their implementations in the computer code Fast Lagrangian Analysis of Continua (FLAC), and uses in the back-analysis of a real case of a twin tunnel in China are presented.

Professor Marte Gutierrez
Colorado School of Mines

The Using Deep Neural Networks to Predict Sensor Response and Geology Ahead of a TBM

Optimal usage of Tunnel boring machines (TBMs) requires information about the soil and rock of the worksite that the TBM is drilling through. In this study, we developed novel methods based on Artificial Intelligence and Deep Neural Networks, to predict the operational parameters of the TBM as well as the soil composition a head of TBM.

Professor Mohammad Pourhomayoun
California State University-LA

Examination of Segmental Liner Loading for Soft Ground Tunnels: Design Approaches vs Actual Behavior

Efficient design of the pre-cast concrete segments can have considerable economic importance, especially in closed face tunneling where the segmental tunnel lining is used as both the temporary and final support. 3D finite-difference analysis simulations together with rare field data from strain gauges installed in segmental lining rings at the Seattle Northgate Link tunnel project are examined to provide a better understanding of lining load developed during EPB shield tunneling. The results of this study show that the final lining loads are controlled by the chamber pressure for pressure balance TBMs with pressurized material in the shield annulus

Tamir Epel
Colorado School of Mines

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