

**Department of Civil Engineering and Engineering Mechanics
Columbia University**

**Analytical and Experimental Approaches for Estimating Tunneling Induced
Ground Displacements**

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2:30PM – 3:30PM
414 Schapiro CEPSR**

The evaluation of tunneling induced greenfield displacement is an important component involved in many procedures for estimating the effects of tunneling on existing structures. The talk will focus on new analytical and experimental approaches for determining the magnitude and shape of the developed greenfield settlement trough, and how these methods can be used in design.

The presentation will focus on three main topics and will be divided accordingly: [1] a new 3D energy based model for prediction of the face "take" volume loss of an advancing tunnel in clays using information from triaxial undrained tests will be presented. The practical use of the developed model will be demonstrated using several tunneling cases in London. [2] the use of fiber optic monitoring for estimation of the volume loss and other ground settlement parameters will be discussed and demonstrated for two field cases. [3] The engineering use of the above analytical and experimental models will be discussed in the context of tunneling effects on existing structures and automated detection systems of attack/terror tunnels.

Assaf Klar is an Associate Professor in the Department of Structural Engineering and Construction Management in the Faculty of Civil and Environmental Engineering at the Technion – Israel Institute of Technology. He obtained his B.Sc. (1999) and Ph.D. (2003) from the Technion, with a follow-up post-doctorate in the Engineering Department of Cambridge University (UK). In 2005 he returned to the Technion as a Senior Lecturer, and in 2011 was promoted to Associate Professor. He currently serves as the associate dean for undergraduate studies. His research involves the study of the effects of tunneling on existing structures, geotechnical earthquake engineering, geotechnical aspects of gas-hydrate bearing sediments, and fiber optic sensing for civil engineering. Prof. Klar has written more than 80 journal and conference papers. He serves as an associate editor in ASCE Journal of Geotechnical and Geoenvironmental Engineering. He is a member of the executive board of TC-102-ISSMGE for ground characterization from in-situ testing and ASTM committee F36 on technology and underground utilities. Prof. Klar is widely engaged with Israel's engineering community, both in standard committees (he is the chairman of the Israeli standard committee for underground structures) and in large-scale engineering projects, such as the bullet train to Eilat and Tel-Aviv underground system.