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Geotechnical risk analysis by flat dilatometer (DMT)

sara amoroso (1) and paola monaco (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, L'Aquila, Italy (sara.amoroso@ingv.it), (2) Department of Civil, Architectural and Environmental Engineering, University of L'Aquila, Italy (paola.monaco@univaq.it)

In the last decades we have assisted at a massive migration from laboratory testing to in situ testing, to the point that, today, in situ testing is often the major part of a geotechnical investigation. The State of the Art indicates that direct-push in situ tests, such as the Cone Penetration Test (CPT) and the Flat Dilatometer Test (DMT), are fast and convenient in situ tests for routine site investigation. In most cases the DMT estimated parameters, in particular the undrained shear strength su and the constrained modulus M, are used with the common design methods of Geotechnical Engineering for evaluating bearing capacity, settlements etc. The paper focuses on the prediction of settlements of shallow foundations, that is probably the No. 1 application of the DMT, especially in sands, where undisturbed samples cannot be retrieved, and on the risk associated with their design.
A compilation of documented case histories that compare DMT-predicted vs observed settlements, was collected by Monaco et al. (2006), indicating that, in general, the constrained modulus M can be considered a reasonable "operative modulus" (relevant to foundations in "working conditions") for settlement predictions based on the traditional linear elastic approach. Indeed, the use of a site investigation method, such as DMT, that improve the accuracy of design parameters, reduces risk, and the design can then center on the site's true soil variability without parasitic test variability. In this respect, Failmezger et al. (1999, 2015) suggested to introduce Beta probability distribution, that provides a realistic and useful description of variability for geotechnical design problems. The paper estimates Beta probability distribution in research sites where DMT tests and observed settlements are available.

References

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