Connecting tailings from the laboratory to in situ through numerical modelling

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# ABSTRACT

One of the challenges of geotechnical practitioners is to take the results of laboratory testing and convert that into practicable outcomes that can be applied in situ. The reasons for this difficulty are that it is impossible to know that the sample being tested in the laboratory is representative of the soil in the field. Just the process of removal during a site investigation result in extensive disturbance even when the most careful procedures are followed, the stress conditions change, densification can occur depending on the method, followed by lifting the sample and transporting it on roads that are often not silky smooth. Then once in the laboratory the problems start; there are limitations of the testing apparatuses and sample preparation, should the sample be moist tamped before placing it in the triaxial or will slurry deposition better represent the field conditions?

This paper seeks to address some of these aspects by linking triaxial testing to the cone penetration testing (CPTu) conducted in the field. This is done through large strain modelling using the particle finite element method (G-PFEM) with an extended version of the Clay and Sand Model (CASM). The workflow followed involved calibration of the CASM on the triaxial results and then simulating the CPTu results using those calibrated soil parameters. The workflow is demonstrated successfully linking the triaxial results to the CPTu field tests. This is followed by examination of the in-situ State Parameter and the role it plays on the stress distribution at the time of failure. Furthermore, recommendations and learnings are provided for future projects and applications. The results show that calibration of numerical models using high quality samples have significant benefits when compared with calibration of results using laboratory remoulded samples. The results highlighted in the study gain relevance when described in the context of performance based design promoted by ICMM.