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Numerical Modeling of Determination of in situ Rock Mass Deformation Modulus Using the Plate Load Test

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Abstract : Accurate determination of rock mass deformation modulus, as an important design parameter, is one of the most controversial issues in most engineering projects. A 3D numerical model of standard plate load test (PLT) using the FLAC3D code was carried to investigate the mechanism governing the test process. Five objectives were the focus of this study. The first goal was to employ 3D modeling in the interpretation of PLT conducted at the Bazoft dam site, Iran. The second objective was to investigate the effect of displacements measuring depth from the loading plates on the calculated moduli. The magnitude of rock mass deformation modulus calculated from PLT depends on anchor depth, and in practice, this may be a cause of error in the selection of realistic deformation modulus for the rock mass. The third goal of the study was to investigate the effect of testing plate diameter on the calculated modulus. Moreover, a comparison of the calculated modulus from ISRM formula, numerical modeling and calculated modulus from the actual PLT carried out at right abutment of the Bazoft dam site was another objective of the study. Finally, the effect of plastic strains on the calculated moduli in each of the loading-unloading cycles for three loading plates was investigated. The geometry, material properties, and boundary conditions on the constructed 3D model were selected based on the in-situ conditions of PLT at Bazoft dam site. A good agreement was achieved between numerical model results and the field tests results.

Keywords : deformation modulus, numerical model, plate loading test, rock mass
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