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TITLE OF DIPLOMA THESIS:

Risk analysis in foundations design

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ABSTRACT

Soil, as a physical material, differs from the technical materials used in human constructions, it is very heterogeneous and the soil parameters have considerable uncertainty. Consequently, the precision in predicting the behavior of constructions in which the soil operates as a foundation is generally limited because the mechanical properties of the soil and the loads are usually not known with absolute accuracy, and additionally, the calculation methods contain approaches.Therefore, it is attempted to take a stochastic approach to the safety margin of geotechnical foundations in order to achieve the required level of safety and the most economical solution possible. This is done in modern geotechnical engineering using the risk analysis method, which includes reliability analysis and sensitivity analysis.In the context of the risk analysis of a geotechnical project, the subject of this diploma thesis is the development of methodology for the determination of critical soil parameters, in selected parameters at a time, for any foundation project.This method is called sensitivity analysis and its implementation involves a number of techniques, qualitative and quantitative. The objective of the sensitivity analysis is to limit the critical parameters of a project, which require further research and study when designing a project, in order to gather more information and knowledge about those parameters. The ultimate goal is to reduce the overall uncertainty and risk of a foundation project.The application of sensitivity analysis methods and techniques studied, was applied to a geotechnical foundation project, and specifically to a multi-block gravity quay wall. The parameters studied were the relative densities of the layers of the given soil profile, with respect to the quay wall response to external seismic excitation. The finite element program used was Plaxis 2D, which is a two-dimensional modeling program.

KEYWORDS

risk analysis, reliability analysis, sensitivity analysis, spider diagram, tornado chart, regression polynomial