

Seismic resilience using artificial intelligence

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Summary

The PhD thesis approach a very interesting and current research theme, all the more so it is desirable that in the near future the stabilization by deep soil mixing to represent a solution for improving the physical and mechanical characteristics of the ground conditions and to replace the traditional expensive solutions like concrete piles.

The PhD thesis contains 6 chapters, as follows:

Chapter 1: "Introduction" presents the importance, objectives and structure of the doctoral thesis on chapters.

Chapter 2: „State of the art of the research regarding the deep soil mixing stabilisation" presents a synthesis of the up-to-date documentation on the basic concepts and particularities of the theme: classifications and types of deep soil mixing technologies, short history, types of applications, the advantages and disadvantages of the method, the chemical reactions and physical processes underlying the soil treatment process, the physical and mechanical properties of the stabilized soil and the influencing factors. The study was mainly conducted during the Erasmus mobility staging at the KTH Royal Institute of Technology - Stockholm, Sweden.



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Chapter 3: “The main stages of a ground improvement project by deep soil mixing method“ details the specific phases of a project. The presentation is also supported by the information obtained during the training sessions conducted by the author at the design and execution departments of Keller Polska, the Warsaw-Poland subsidiary. The following investigation programs are presented: the site geotechnical conditions, properties of the soil mixed with stabilizing agents and the performance of the trials elements; the stages of geotechnical design, execution and control of the quality of the elements result by deep soil mixing method.

Chapter 4: “The laboratory experimental program - the assessment of the geotechnical parameters of a loess soil mixed with cement slurry” mainly refers to: the chemical-mineralogical, physical and mechanical characteristics of the natural soil conditions, cement and stabilized soil, the preparation, storage and testing procedure of soil-cement suspension samples, and also interpreting and drawing conclusions on the results of laboratory tests.

Chapter 5: “The deep soil mixing method used in order to increase the safety of the structure – ground foundation system” presents the practical and experimental approach of a case study – ground improvement for a hall located in Alba County. In collaboration with SBR Soletanche Bachy Foundations - Bucharest subsidiary, the author was responsible for planning and conducting research activities related to laboratory investigations, in situ experimental polygons, as well as performing laboratory tests during the execution phase of the columns under the existing foundations of the hall. The chapter details aspects like: the description of the objective analysed, the initial field conditions, the analyses and tests performed in the laboratory and field experimental programs in which the slurry cement recipe was established and the characteristics of the columns and their influence on the untreated field were evaluated, methodologies approached in the geotechnical design of stabilized soil columns, technical and economic analysis performed in comparison with traditional technology, technology and equipment for execution, control and quality assurance during and post-execution.

Chapter 6: “General conclusions. Personal contributions. Results dissemination” conclusions on the subject of the thesis, highlighting the personal contributions and the results dissemination of the results obtained within the scientific research program.

