عنوان مقاله:

Reliability Analysis of Surface Settlement caused by Mechanized Tunneling-a Case Study

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خلاصه مقاله:

The surface settlement is an essential parameter in the operation of mechanized tunneling that should be determined before excavation. The surface settlement analysis caused by mechanized tunneling is a geo-technical problem characterized by various sources of uncertainty. Unlike the deterministic methods, the reliability analysis can take into account the uncertainties for the surface settlement assessment. In this work, the reliability analysis methods (second-order reliability method (SORM), Monte Carlo simulation (MCS), and first-order reliability method (FORM)) based on the genetic algorithm (GA) are utilized to build models for the reliability analysis of the surface settlement. Specifically, for large-scale projects, the limit state function (LSF) is non-linear and hard to apply based on the reliability methods. In order to resolve this problem, the GMDH (group method of data handling) neural network can estimate LSF without the need for additional assumptions about the function form. In this work, the GMDH neural network is adapted to obtain LSF. In the GMDH neural network, the tail void grouting pressure, groundwater level from tunnel invert, depth, average penetrate rate, distance from shaft, pitching angle, average face pressure, and percent tail void grout filling are used as the input parameters. At the same time, the surface settlement is the output parameter. The field data .from the Bangkok subway is used in order to illustrate the capabilities of the proposed reliability methods

کلمات کلیدی:

Surface settlement, Mechanized tunneling, Reliability methods, GMDH neural network, Genetic Algorithm