

## Abstract

Selecting an appropriate excavation support system is a key for successful completion of a project. The selection process depends mainly upon the subjective opinion of construction practitioners. Therefore, this experience has to be documented and stored in the company database for usage in future projects. However, such an evaluation involves a complex decision-making process associated with numerous uncertainty factors, imprecise information and judgments. The common excavation support systems used in Egypt are: diaphragm wall, secant pile, sheet pile, soldier pile and contiguous piling.

Artificial Intelligence has been used successfully for modeling and evaluates almost all aspects of foundation constructions and related alternatives. Artificial Intelligence approaches are useful tools to simulate a human's decision-making process. The Analytical Hierarchy Process (AHP) has been widely applied to evaluate alternatives related to multiple decision criteria. Nevertheless, the AHP is incapable of dealing with the inherent subjectivity and ambiguity existing in the mapping of the decision-makers judgment to exact numerical values.

This study introduces an attempt to store the experts' subjective experience using a fuzzy AHP approach in an attempt to determine the suitable excavation support system. The approach employs triangular fuzzy numbers and the  $\alpha$ -cut concept to better represent the degrees of uncertainty held by the decision-maker. A case study concerning an excavation jobs is presented to illustrate the applicability of the developed model.