

Neural network application in forecasting maximum wall deflection in homogenous clay

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Abstract

An attempt was carried out by using a neural network to predict the maximum deflection and its position caused by braced excavation in homogeneous clay. Six input variables, including excavation depth, Ratio of EI wall/EI of brace, the vertical distance between bracing, Length to width ratio of an excavation, shear strength, and the coefficient of lateral earth pressure, were adopted. Two models were developed, one is to estimate the maximum deflection and the other one to estimate the position of maximum deflection. The ANN models were developed and verified using a database of (169) cases of actual measured and presumptive cases using the analysis with the Finite element of maximum deflection. A sensitivity analysis was accomplished, to examine the relative significance of the parameters that influence the maximum deflection of the wall and its position; it indicates that the Ratio of EI wall/EI of brace has the most significant effect on the maximum wall deflection, while the properties of the soil have the most considerable effects on the position. The results show that the ANN can reasonably forecast the magnitude of the maximum deflection of the wall, as well as its position. Design charts are developed based on the ANN model.