

Prediction of pressuremeter modulus (E_M) using GMDH neural network: a case study of Kenny Hill Formation

Abstract

Soil investigation (SI) work is a process of collecting subsurface ground profile information in evaluating soil engineering properties for a construction project. The standard penetration method (SPT) is widely accepted worldwide as a feasible and relatively inexpensive method over other field tests. Pressuremeter test (PMT), on the other hand, is costly and more popular in situ method in interpreting soil deformation behavior. Considering SPT is available in almost site investigation works for all sizes of project, it was tempting to establish the correlation between SPT and PMT results, specifically in local geologic setting. The study was conducted in Kenny Hill Formation, Kuala Lumpur, Malaysia. The correlation established in this study is between pressuremeter modulus (E_M) and SPT blow count (N_{60}). In addition to in situ methods, the physical properties of soil extruded from boreholes were tested in geotechnical laboratories to determine soil properties, such as particle size distribution, liquid limit, and plastic limit. These parameters need to be considered during prediction of E_M . Group method of data handling (GMDH) neural network has been used to achieve this objective. The mean absolute error (MAE) results show that the GMDH neural networks produce values of 8.04 and 8.59 for training and testing. The root mean square error (RMSE) yields 10.61 and 10.84 for training and testing, respectively. Further, the results of the coefficients of determination (R^2) are 0.794 and 0.726 for training and testing demonstrates a good correlation exists between predicted and measured values. Based on the GMDH results, N_{60} , sand, and clay are required input variables for determination of E_M .

Keywords

Group method of data handling; Kenny Hill Formation; Pressuremeter modulus