Civil Infrastructure Researches, Vol. 7, Issue.1, Spring and Summer 2021, pp. 93-109

A.R. Ghanizadeh *

Department of Civil Engineering, Sirjan University of Technology, Sirjan.

e-mail: ghanizadeh@sirjantech.ac.ir

A. Delaram

Department of Civil Engineering, Sirjan University of Technology, Sirjan.

e-mail: ali.delaram7397@gmail.com

Development of Predicting Model for Clay Subgrade Soil Resilient Modulus based on the Results of Cone Penetration Test using Evolutionary Polynomial Regression Method

Accurate determination of resilience modulus (M_r) of pavement subgrade soil is one of the important factors for successful design of pavement structure. This parameter is usually measured using a dynamic triaxial test, which is a complex and expensive experiment. In this study, the evolutionary polynomial regression (EPR) method has been used to develop a model for predicting the resilient modulus of clay subgrade soils based on the results of cone penetration test (CPT). By means of the developed model, the resilient modulus of subgrade soils can be estimated by having the parameters of cone tip resistance (q_c), slave friction resistance (f_s), moisture content (w) and dry density (γ_d). The results of this study show that the model developed by the exponential function is the best model constructed. Based on the developed model, the coefficient of determination (R^2) for training set, testing set and total set was 0.9808, 0.9714 and 0.9785, respectively. The sensitivity analysis performed also showed the very good agreement of the developed model in predicting the resilient modulus of subgrade soil. The results of sensitivity analysis showed that the moisture content is the least important parameter for predicting the resilient modulus of fine-grained soils and the importance of other parameters is almost the same. In this study, the effect of different parameters on the resilient modulus of subgrade soil has also been evaluated using parametric analysis.

Keywords: Resilient Modulus, Clay Subgrade Soil, Cone Penetration Test (CPT), Evolutionary Polynomial Regression (EPR)

* Corresponding author
Received 07 July 2021, Revised 23 August 2021, Accepted 26 August 2021.
DOI: 10.22091/cer.2021.7122.1267