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T. Heidari Dezfuli

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

e-mail: Tobahd1371@gmail.com

A.R. Ghanizadeh*

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

e-mail: ghanizadeh@sirjantech.ac.ir

Prediction of Compressive and Tensile Strength of Clayey Subgrade Soil Stabilized With Portland Cement and Iron Ore Mine Tailing Using Computational Intelligence Methods

One of the Practical solutions for improving subgrade soil is the utilization of additives for soil stabilization. Generally, the unconfined compressive strength (UCS) and indirect tensile strength (ITS) tests are employed for quality control of stabilized materials. These tests are time- consuming due to the time needs for curing of samples, and can also be costly if the number of samples increases. In this study, we have employed two methods including artificial neural network (ANN) and adaptive neuro-fuzzy inference system (ANFIS) to predict UCS and ITS of clayey subgrade soil stabilized with Portland cement and iron ore mine tailing (IOMT). To this end, cement content, IOMT content, optimum moisture, and curing time were considered as input parameters, and unconfined compressive strength, as well as indirect tensile strength, were considered as output parameters and in each case a dataset consisting of 100 data points were used for developing computational intelligence models. Modeling by means of these three methods confirmsthe superiority of the artificial neural network model over ANFIS model. Also, the sensitivity analysis showed that the Portland cement content and IOMT Content have the greatest and lowest effect on the predicted compressive and tensile strength, respectively.

Keywords: Unconfined Compressive Strength, Indirect Tensile Strength, clay Soil, Portland cement and iron ore mine tailings, computational intelligence.

* Corresponding author
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