**Improved predictability** **of axial compressive of elliptical-shaped concrete-filled steel tubular columns using Artificial Neural Network and Genetic Algorithm**

Duy-Duan Nguyen 1, Ngoc-Long Tran 1, and Trong-Ha Nguyen 1\*

*1* *Department of Civil Engineering, Vinh University, Vinh 461010, Vietnam*

*\*Corresponding author: trongha@vinhuni.edu.vn*

**Abstract.** This study aims to improve the predictability of axial compressive of elliptical-shaped concrete-filled steel tubular (CFST) columns using the ANN-GA model, which combined an Artificial Neural Network (ANN) and Genetic Algorithm (GA). To achieve the goal, firstly a set of 145 data has been collected from previously published include column length, the major axis diameter, the minor axis diameter, the thickness of the steel tube, the yield strength of the steel tube, and the compressive strength of concrete considered input parameters and axial compression capacity is output parameter of ANN-LM model. Secondly, an ANN-LM structure has been selected based on the trial-and-error method to obtain the number of neurons in the hidden layer. This ANN-LM structure was then combined with GA to optimize the predicted value of elliptical-shaped CFST based on weight and bias. The predictive performance of the ANN-GA model was compared with the ANN-LM model and previously published through statistical indicators, which are R-square, RMSE, MAPE, and i20-index. To apply the efficient ANN-GA model in practical designs, a new Graphical User Interface (GUI) tool was developed.

**Keywords:** artificial neural network, genetic algorithm, elliptical-shaped CFST column, graphical user interface, axial compression capacity.