عنوان مقاله:

Prediction of suction caissons behavior in cohesive soils using computational intelligence methods

محل انتشار:

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خلاصه مقاله:

Compared to drag anchors, suction caissons (Q) in clays often provide a cost-effective alternative for jacket structures, catenary, tension leg moorings, and taut leg. In this research, two computational approaches are proposed for predicting the uplift capacity of Q in clays. The proposed approaches are based on the combinations of adaptive network-based fuzzy inference system (ANFIS) models (ANFIS-subtractive clustering (ANFIS-SC) and ANFIS-fuzzy c-means (ANFIS-FC)) with metaheuristic techniques (ant colony optimization (ACO) or particle swarm optimization (PSO)). In these approaches, the PSO and ACO algorithms are employed to enhance the accuracy of ANFIS models. In order to develop hybrid models, a comprehensive database from open-source literature is used to train and test the proposed models. In these models, d (diameter of caisson), L (embedded length), D (depth), Su (undrained shear strength of soil), θ (inclined angle), and Tk (load rate parameter) were used as the input parameters. The performance of all models was evaluated by comparing performance indexes, i.e., means squared error and squared correlation coefficient. As a result, PSO and ACO can be used as reliable algorithms to enhance the accuracy of ANFIS models. Moreover, it was found that the ANFIS– subtractive clustering-ACO model provides better results in comparison with other developed hybrid models.

کلمات کلیدی:

ANFIS, metaheuristic techniques, subtractive clustering method, fuzzy c-means clustering method, suction caissons capacity