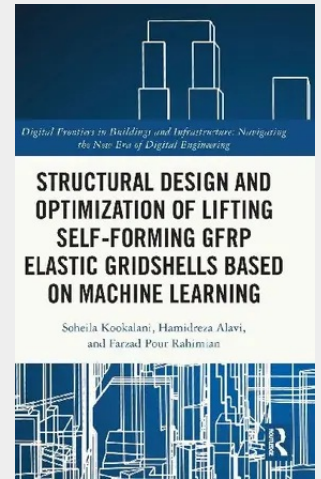


Structural Design and Optimization of Lifting Self-forming GFRP Elastic Gridshells based on Machine Learning

Structural Design and Optimization of Lifting Self-forming GFRP Elastic Gridshells Based on Machine Learning presents the algorithms of machine learning (ML) that can be used for the structural design and optimization of glass fiber reinforced polymer (GFRP) elastic gridshells, including linear regression, ridge regression, K-nearest neighbors, decision tree, random forest, AdaBoost, XGBoost, artificial neural network, support vector machine (SVM), and six enhanced forms of SVM. It also introduces interpretable ML approaches, including partial dependence plot, accumulated local effects, and SHaply additive exPlanations (SHAP). Also, several methods for developing ML algorithms, including K-fold cross-validation (CV), Taguchi, a technique for order preference by similarity to ideal solution (TOPSIS), and multi-objective particle swarm optimization (MOPSO), are proposed. These algorithms are implemented to improve the applications of gridshell structures using a comprehensive representation of ML models. This research introduces novel frameworks for shape prediction, form-finding, structural performance assessment, and shape optimization of lifting self-forming GFRP elastic gridshells using ML methods. This book will be of interest to researchers and academics interested in advanced design methods and ML technology in architecture, engineering, and construction fields.

This book aims to develop structural design and optimization methods of lifting self-forming Glass fiber reinforced polymer (GFRP) elastic gridshells based on machine learning (ML).



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