عنوان مقاله:

Predicting the Inelastic Response of Base Isolated Structures Utilizing Regression Analysis and Artificial Neural Network

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خلاصه مقاله:

Indeed, utilizing a base isolation system in RC structures can remarkably minimize the possibility of failure, particularly in seismic-prone countries. Despite that, the design of these structures is a long procedure that consists of choosing the appropriate isolator to optimize the nonlinear behavior of the superstructure. Moreover, the numerical simulations require huge computational effort when high accuracy is required. In recent decades, scientists and engineers have applied numerous estimation approaches such as multiple linear regression and artificial neural networks to decrease the required cost and time for daily design problems. Thus, this study's main objective is to solve the difficulty of rapid response prediction by using soft-computing techniques. Additionally, it aims to study the capability of multiple linear regression and artificial neural networks in estimating the seismic performance of base-isolated RC structures under earthquakes. A nonlinear response history analysis of four different lead rubber-bearing isolated RC structures will be performed in order to determine the responses of these structures. Subsequently, the prediction models will be developed using the responses of the structures as inputs for multiple linear regression and artificial neural networks. Lastly, the reliability of both estimation approaches in terms of the response of base-isolated structures will be investigated by comparing the prediction models' capability. In general, the results of the study show that artificial neural networks provide considerably better accuracy in estimating base-isolated structures compared to multiple linear regression, and their performance results in reliable prediction. Doi : ۱۰.۲۸۹۹۱/CEJ-۲۰۲۲-۰۸-۰۶-۰۷ Full Text : PDF

کلمات کلیدی:

Reinforced Concrete; Lead Rubber Bearing Isolator; Pulse-Like and Non-Pulse-Like Earthquakes; Multiple Linear Regression; Artificial Neural Network.

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