عنوان مقاله:

Seismic Analysis of RC Buildings subjected to Near-Fault Earthquakes having Fling Step using Artificial Neural Networks

محل انتشار:

نهمین کنگره بین المللی مهندسی عمران (سال: 1391)

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خلاصه مقاله:

Near-fault ground motions with long-period pulses have been identified as being critical in the design of structures. These motions, which have caused severe damage in recent disastrous earthquakes, are characterized by a short-duration impulsive motion that transmits large amounts of energy into the structures at the beginning of an earthquake. The permanent displacement effect caused by the fault slip leads to unrecoverable deformation of the ground. The velocity time history reveals one-sided step pulse or partially one-sided pulse-like shape while the displacement history reveals one-sided step pulse called fling step. Fling is a strong velocity pulse that results in permanent ground displacement. The objective of this study is to investigate the adequacy of Artificial NeuralNetworks (ANN) to determine the three dimensional dynamic response of buildings under the near-fault earthquakes having fling step. For this purpose, four ANN models were proposed to estimate the fundamental periods, base shear force, base bending moments androof displacement of buildings in two directions. The same input layer was submitted to different types of ANN models for various outcomes. In the ANN models, a multilayer perceptron (MLP) with a back-propagation (BP) algorithm was employed using a scaled conjugate gradient. ANN models were developed, trained and tested in a MATLAB based program. A training set of 168 and a validation set of 21 buildings were produced fromdynamic response of RC buildings under the near-fault earthquakes. Finite Element Analysis (FEA) was used to generate training and testing set of ANN models. It was demonstrated that the neural network based approach is highly successful to determine response of RC buildings subjected to near-fault earthquakes.

کلمات کلیدی:

Dynamic analysis; RC buildings; artificial neural networks; near-fault earthquake, fling step