عنوان مقاله:

GENERATION OF OPTIMIZED SPECTRUM COMPATIBLE NEAR-FIELD PULSE-LIKE GROUND MOTIONS USING ARTIFICIAL INTELLIGENCE

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خلاصه مقاله:

The existence of recorded accelerograms to perform dynamic inelastic time history analysis is of the utmost importance especially in near-fault regions where directivity pulses impose extreme demands on structures and cause widespread damages. But due to the scarcity of recorded acceleration time histories, it is common to generate proper artificial ground motions. In this paper an alternative approach is proposed to generate near-fault pulse-like ground motions. A smoothening approach is taken to extract directivity pulses from an ensemble of near-fault pulse-like ground motions. First, it is proposed to simulate nonpulse-type ground motion using Adaptive Neuro-Fuzzy Inference Systems (ANFIS) and Wavelet Packet Transform (WPT). Next, the pulse-like ground motion is produced by superimposing directivity pulse on the previously generated nonpulse-type motion. The main objective of this study is to generate near-field spectrum compatible records. Particle Swarm Optimization (PSO) is employed to optimize both the parameters of pulse model and cluster radius in subtractive clustering and Principle Component Analysis (PCA) is used to reduce the dimension of ANFIS input vectors. Artificial records are generated for the first, second and third level of wavelet packet decomposition. Finally, a number of interpretive examples are presented to show how the method works. The results show that the response spectra of generated records are decently compatible with the target near-field spectrum, which is the main objective of the study.

کلمات کلیدی:

near-field, directivity, synthetic ground motion, pulse-like, wavelet analysis, ANFIS.

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