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Optimization of a fuzzy logic controller for MR dampers using ANFIS

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Abstract

Fuzzy controllers have been successfully applied to a wide range of engineering problems due its robustness and the ability to deal with non-linear plants. Despite the inherent advantages of these controllers, there is no systematic technique for converting human knowledge into the rule base of a fuzzy inference system. Adaptive neuro-fuzzy inference system (ANFIS) is an artificial intelligence technique that has been successfully used for mapping input-output relationships based on available data sets, i.e., to automatically adjust a fuzzy inference system with a backpropagation algorithm based on training data. This paper presents the application of a ANFIS model to optimize the parameters of a fuzzy controller for structural control of a building structure using a MR damper. The results obtained with the neuro-fuzzy controller are compared with those of a passive control modes to assess the performance of the proposed control system in reducing the seismic response of the structure.

Keywords

Structural control, fuzzy logic controller, MR dampers