A Prediction Model for Dynamic Responses of Building from Earthquake Based on Evolutionary Learning

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Abstract : The seismic responses-based structural health monitoring system has been performed to prevent seismic damage. Structural seismic damage of building is caused by the instantaneous stress concentration which is related with dynamic characteristic of earthquake. Meanwhile, seismic response analysis to estimate the dynamic responses of building demands significantly high computational cost. To prevent the failure of structural members from the characteristic of the earthquake and the significantly high computational cost for seismic response analysis, this paper presents an artificial neural network (ANN) based prediction model for dynamic responses of building considering specific time length. Through the measured dynamic responses, input and output node of the ANN are formed by the length of specific time, and adopted for the training. In the model, evolutionary radial basis function neural network (ERBFNN), that radial basis function network (RBFN) is integrated with evolutionary optimization algorithm to find variables in RBF, is implemented. The effectiveness of the proposed model is verified through an analytical study applying responses from dynamic analysis for multi-degree of freedom system to training data in ERBFNN.