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PREDICTION OF SNOW LOAD OF UNEVEN DISTRIBUTION BASED ON BACK-PROPAGATION NEURAL NETWORK

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Traditional study methods of snow load contain three aspects: field observations, experimental simulation and numerical simulation. But there are shortcomings such as heavy workload and high cost in test, large deviation and strong sensitivity to random errors in emulation. The back propagation neural network (BPNN) is a powerful algorithm of artificial intelligence technique, which is increasingly used in the engineering field. This paper focuses on the prediction of the snow load distribution based on BPNN.

At first, collect distribution records of snow load about different dimension in the top of models, especially $1m^2$ and $0.5m^2$; establish the database of snow load, considering all test records of field observations about test models in Harbin City. Then take one partial data as the training set, and get the structure and parameters of BPNN during test the rest data step by step; after studying network, coefficient matrix of each unit which includes input layer, intermediate layer and output layer is gained. Finally, according to the experimental database, both considering wind speed and wind direction, it is established the snow load forecasting model respectively.

The prediction results show that the BPNN is suitable for simulation the complex nonlinearity distribution of snow load. To determine the parameters of model on number of node in hidden layers, learning rate and shape factor, the model is verified and exemplified, and the influence of the number of links in the hidden layer of network on final result is analysed. There is some limitation on predicting of peak value, but the snow load distribution is smooth and continuous, which is nearly close to test records.

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