Steel building frame design with logarithm-link back-propagation neural networks

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Abstract

A necessary first step in any structural design process concerned with the selection of initial member sizes is to make a good initial estimation of cross-section (i.e. close to the final size) which will thus reduce the number of analysis/design cycles in the subsequent sizing processes. Two distinct network architectures, a standard back-propagation network and the novel logarithm-link back-propagation network proposed in this paper, are here examined for their efficiency and accuracy in modeling a steel building frame design. The results show that the logarithm units in the network provide an efficient framework, with reduced nonlinear relation between inputs and outputs of the network. Within this network, effective learning can take place and this representational change can be used to enhance the domain-independent techniques presently available for improving the performance of back-propagation networks.

Keyword： steel frame, neural networks, back-propagation, logarithm.