

# Effect of an Insulation Layer to Prevent Water Vapor Condensation along the Inside Surface of a Building Wall Using an Artificial Neural Network

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**Abstract:** A theoretical analysis was performed to study the attenuation of a heat wave through two composite walls. Each wall was made of three homogenous layers in addition to an insulation layer, all of which were made of local materials. One way to attenuate this heat wave was to apply insulation inside the wall. In this work, an artificial neural network (ANN) was developed to study the effect of insulation materials on a building wall through a four-layered wall. The layer material type, the layer thickness, and the inside and outside temperature were used in the input layer of the network, whereas the temperature distribution was in the output layer of the network. Data that were obtained from previous experiments were used to train the neural network. It was found that the algorithm used (Levenberg-Marquardt) was very much capable of estimating the temperature distribution within each of the four-layered walls with excellent accuracy. DOI: [10.1061/\(ASCE\)IS.1943-555X.0000207](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000207). © 2014 American Society of Civil Engineers.

**Author keywords:** Neural network; Water vapor condensation; Insulated wall; Feedforward neural network.