

## Modeling of Heat Transfer in Air Cooler Equipped with Classic Twisted Tape Inserts Using ANFIS

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### Abstract

This paper reports the application of adaptive neuro-fuzzy inference system (ANFIS) to predict model the experimental results of heat transfer in an air cooled heat exchanger equipped with classic twisted tape inserts. The aim of the present paper is to consider the effects of the twist ratio of classic inserts ranging from 1.76 to 3.53 and Reynolds number from 4021 to 16118 on average heat transfer in the air cooled heat exchanger. The training data for optimizing the ANFIS structure is obtained experimentally. A hybrid learning algorithm consists of gradient descend method and least-squares method is used for ANFIS training. The proposed ANFIS developed using MATLAB functions. For the best ANFIS structure obtained in this study, the maximum errors of the train and test data were found to be 0.111% and 2.378%, respectively. Also the mean relative errors of the train and test data were found to be 0.011% and 1.316%, respectively. Average Nusselt number versus twist ratio, for some arbitrary Reynolds number is presented by some figures in this paper. The predicted results showed that ANFIS is a powerful instrument for predicting the experimental results due to its low error and therefore the ANFIS results can be used to model the experiment precisely.

**Keywords:** Air cooled heat exchanger, Heat transfer, Classic twisted tape inserts, Modeling, ANFIS.

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