Abstract

This study examines modeling and simulation of the transient thermal behavior of a solar collector adsorber tube. The data used for model setup and validation were taken experimentally during the start-up procedure of a solar collector adsorber tube. ANN models are developed based on the nonlinear autoregressive with exogenous input NARX model and are implemented using the MATLAB® tools including the Neural Network ToolboxTM. It is considered that the data used for model training and validation are experimental data taken during solar collector operation using standard instrumentation. The neural network predictions agreed well with experimental values with mean squared error which are near 0 and the best fit between outputs and targets (R) are very close to 1. These results showed that NARX models (1–12–1 with d1 = 10, d2 = 9 and 35 epochs) can successfully be used to predict thermal performance of the adsorber tube.
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**Index Terms**

Computer Science  
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**Keywords**

Solar radiation  
solar collector  
adsorber tube temperature  
neural network