UNIVERSITI TEKNOLOGI MARA

OPTIMIZATION OF NEURAL NETWORK TOPOLOGY FOR PREDICTION OF OUTLET TEMPERATURE OF SHELL AND TUBE HEAT EXCHANGER

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ABSTRACT

Performance of heat exchanger always fluctuating because of non-linearity property of heat transfer rate, Q. Artificial Neural Network (ANN), is applied for nearly a decades in most industries for its ability to project the non-linear property of heat transfer rate. Training algorithms used in this experiment to optimize the heat exchanger are trainlm,trainbr and trainscg. A neural network is constructed to best fit the prediction of outlet temperature of the shell and tube heat exchanger with crossing flow fluids.

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CHAPTER 1

INTRODUCTION

1. RESEARCH BACKGROUND.

One big problem that comes with heat exchanger problem is thermal analysis. Any theoretical things related to the heat exchangers requires more assumptions and complicated equations such as Log Mean Temperature Difference Method (LMTD) that requires the flow rates of both streams, inlet and outlet temperature of both hot and cold streams. Whereas for the experimental setup an initial investment is needed but it is expensive. Hence with the application of Artificial Neural Network to the heat exchanger, problems solved and its existence almost nearly two decades. Prediction of heat exchanger is vital to the industry and have wide application such as prediction of heat transfer rate and pressure drop, prediction of performance due to fouling and deposition, and prediction of temperature distribution. Examples of applications of ANN are refrigeration, modelling of energy systems and renewable energy systems and for chemical process control. There are two important keypoints whenever related to ANN, such as configuration for process specification and also type of parameters decided to be estimated. Advantages of using the ANN over other methods such as Fuzzy are, ability to handle large amount of data sets, to detect nonlinear complexity relationships between dependent and independent variables and discover possible connections with between predictor variables.