

## Prediction of Performance for an Ejector Refrigeration Cycle Working with R245fa Using Artificial Neural Network

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**Abstract** - In this paper, an artificial neural network (ANN) model is used to predict the performance parameters of an ejector refrigeration cycle working with R245fa. Three approaches are used to achieve this objective: experimental analysis, thermodynamic modeling, and artificial neural network. Fourteen parameters were collected from eight numerical or experimental studies. The ANN input parameters include geometric features ( $D_{col}$ ,  $D_{primout}$ ,  $NXP$ ,  $D_{cas}$ ,  $L_{cas}$ ,  $D_{out}$ ,  $L_{diff}$ ) and operating conditions ( $P_{prim}$ ,  $T_{prim}$ ,  $P_{sec}$ ,  $T_{sec}$ ,  $T_{cond}$ ), while the outputs are the ejector performance metrics. A computer program has been written in MATLAB using a neural network toolbox. The mean-square error (MSE) and the linear coefficient of correlation ( $R^2$ ) have been chosen as metrics to evaluate the performance function and accuracy of the ANN model. In terms of the limiting compression ratio ( $P_{cr}$ ) and entrainment ratio ( $\omega$ ), the ANN deviates by 3.63 (%) and 1.52 (%) respectively relative to the experimental data and by -4.01 (%) and -6.17 (%) relative to the thermodynamic model predictions.

**Keywords:** Artificial neural network, refrigeration cycle, ejector, R245fa.