Prediction of generated power from steam turbine waste heat recovery mechanism system on naturally aspirated spark ignition engine using artificial neural network

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Abstract

The waste heat from exhaust gases represents a significant amount of thermal energy, which has conventionally been used for combined heating and power applications. This paper proposes a prediction model on the performance of a naturally aspirated spark ignition engine equipped with a waste heat recovery mechanism (WHRM) using steam turbine mechanism. The simulation method is created using an artificial neural network (ANN) to predict the power produced from this WHRM. The automated neural network was employed to run the simulation, where the ANN analysis used multilayer perceptrons as the network architecture, which is a feed-forward neural network architecture with uni-directional full connections between successive layers and applied

Broyden–Fletcher–Goldfarb–Shanno algorithm iterative techniques to train the data. By using ANN, power generated from this WHRM could be predicted with good accuracy of 0.007, 0.011, and 0.016% error on training, test and validation data, respectively.

Keywords

Waste heat recovery Organic rankine cycle Exhaust gas Artificial neural network

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Notes

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interests.

Human and animal rights

This article does not contain any studies with human participants or animals performed by any of the authors.

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