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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SOFT COMPUTING
Volume: 22 **Issue:** 18 **Pages:** 5955-5964 **Special Issue:** SI
DOI: 10.1007/s00500-017-2873-3
Published: SEP 2018
Document Type: Article; Proceedings Paper
View Journal Impact

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

Author Keywords: Waste heat recovery; Organic rankine cycle; Exhaust gas; Artificial neural network
KeyWords Plus: ORGANIC RANKINE-CYCLE; INTERNAL-COMBUSTION ENGINES; DIESEL-ENGINE; GASOLINE-ENGINE; PERFORMANCE PREDICTION; EXHAUST ENERGY; PASSENGER CAR; EFFICIENCY; EXCHANGER; GAS

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Funding

Funding Agency	Grant Number
Universiti Teknikal Malaysia Melaka (UTeM)	FRGS/2/2014/TK06/FKM/02/F00236
Ministry of Higher Education Malaysia	FRGS/2/2014/TK06/FKM/02/F00236

View funding text

Publisher

SPRINGER, 233 SPRING ST, NEW YORK, NY 10013 USA

Categories / Classification

Research Areas: Computer Science

Web of Science Categories: Computer Science, Artificial Intelligence; Computer Science, Interdisciplinary Applications

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