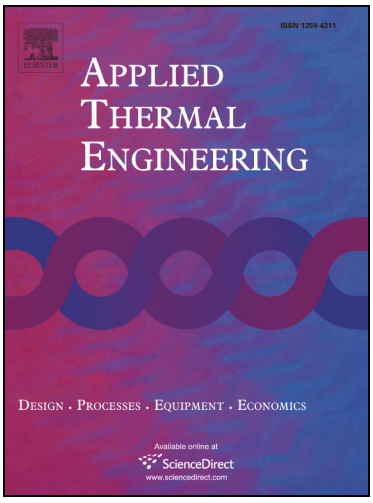

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Abstract

Air mass flow determination is one of the main variables on the control of internal combustion engines. Effectiveness of intake air systems is evaluated through the volumetric efficiency coefficient. Intake air systems characterization by means of physical models needs either significant amount of input data or notable calculation times. Because of these drawbacks, empirical approaches are often used by means of black-box models based on Artificial Neural Networks. As alternative to the standard gradient descendent method an adaptive learning algorithm is developed based on the increase of hidden layer weight update speed. The results presented in this paper show that the proposed adaptive learning method performs with higher learning speed, reduced computational resources and lower network complexities. A parametric study of several Multiple Layer Perceptron (MLP) networks is carried out with the variation of the number of epochs, number of hidden neurons, momentum coefficient and learning algorithm. The training and validation data are obtained from steady state tests carried out in an automotive turbocharged diesel engine.

Keywords

Artificial Neural Networks; Adaptive learning; Diesel engines modeling; Volumetric efficiency.