

عنوان مقاله:

EFFECTS OF CERIUM OXIDE NANOPARTICLE ADDITION IN DIESEL AND DIESEL-BIODIESEL BLENDS ON THE PERFORMANCE CHARACTERISTICS OF A CI ENGINE WITH AN ARTIFICIAL NEURAL NETWORK

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خلاصه مقاله:

This study deals with artificial neural network (ANN) modeling of a single diesel engine using cerium oxide nanoparticles as additive in waste cooking biodiesel and pure diesl fuel blends to predict the brake power, torque, brake specific fuel consumption of the engine. To acquire data for training and testing the proposed ANN, a single cylinder, direct injection, four-stroke diesel engine was fuelled with cerium oxide nanoparticles, waste cooking biodiesel and diesel fuel blends and operated at different engine speeds. The properties of biodiesel produced from waste vegetable oil was measured based on ASTM standards. The experimental results revealed that blends of cerium oxide nanoparticles ,waste vegetable oil methyl ester with diesel fuel provide better engine performance characteristics. Using some of the experimental data for training, an ANN model was developed based on standard Back-Propagation algorithm for the engine. Multi layer perception network (MLP) was used for non-linear mapping between the input and output parameters. Different activation functions and several rules were used to assess the percentage error between the desired and the predicted values. It was observed that the ANN model can predict the engine performance well with correlation coefficient (R) 4.023, 4.040 and 4.04 for the engine brake power, torque and brake specific fuel consumption, respectively. The prediction MSE (Mean Square Error) error was between the desired outputs as measured values and the simulated values were obtained as 4.442, 4.4101 and 4.443 for the engine brake power, torque and brake specific fuel consumption, respectively by the model

كلمات كليدى:

Waste cooking biodiesel; cerium oxide nanoparticles; Artificial neural network; Single diesel engine

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