Multi-Objective Optimization Using Differential Evolution for Modeling Automotive Palm Oil Biodiesel Engine

Abstract

This paper proposes an algorithm called multi-objective optimization using differential evolution (MOODE) for providing the optimal mathematical model of automotive palm oil biodiesel engine. The biodiesel engine is treated as a black box where the acquired input-output data is used in the modeling processes. Two objective functions are considered for optimization; minimizing the number of term of a model structure and minimizing the mean square error between actual and predicted outputs. Nonlinear auto-regressive with exogenous input (NARX) model is used to represent the mathematical model of the investigated system. To obtain an optimal model for representing the dynamic behavior of automotive palm oil biodiesel engine, the model validity tests have been applied.

Keywords; System identification; multi-objective optimization; differential algorithm; palm oil biodiesel; NARX model