

# **Real-time control of automotive fuelled with Malaysian palm oil biodiesel**

## **Abstract**

With the rapid decline in energy resources, the increasing environmental concerns, and the high demand of energy consumption, many countries have been looking for alternative energy to substitute fossil fuel. One of the alternatives is to use bio-fuel as renewable energy. This paper describes the real-time control of automotive engine fuelled with palm oil biodiesel (Palm Methyl Esters). A self-tuning control algorithm based on pole assignment method is presented and an on-line model parameters estimation strategy based on the recursive least squares method is developed. Assuming a discrete time form for the system model, an Autoregressive eXogenous (ARX) model structure was selected in this work. The estimation strategy recursively updates the system dynamics of the engine in order for the self-tuning controller to control the engine speed for the best possible transient and steady state response at the speed range from 1800 rpm to 2300 rpm. Real-time results of the on-line parameter estimation and self-tuning speed controller implemented for automotive engine fuelled with palm biodiesel were presented. Finally, the performance of the speed controller error was examined.