Hyperheuristics Trajectory Based Optimization for Energy Management Strategy (EMS) of Split Plug-In Hybrid Electric Vehicle

Muhammad Ikram Mohd Rashid, Hamdan Daniyal and Mohd Ashraf Ahmad

Faculty of Electrical & Electronic Engineering
University Malaysia Pahang
mikram@ump.edu.my

Abstract:
With increasing concern over the environment and ever stringent emissions regulations, the electric vehicle has been investigated as an alternative form of transportation. However, the electric vehicle suffers from relatively short range and long charging times and consequently has not become an acceptable solution to the automotive consumer. The challenge is to develop an efficient energy management strategy (EMS) to satisfy the objectives while not having a reduced vehicle performance. This project discusses the Hyperheuristics Trajectory Based Optimization for Energy Management Strategy (EMS) of Split PlugIn Hybrid Electric Vehicle. The Split Plug-in HEV is discussed in a new perspective from the EMS point of view. A thorough discussion is made encompassing the advantages and disadvantages of the concept, its performance compared to conventional HEVs and the way forward. The modelling and simulation capability of existing tools such as free model in Matlab Simulink is demonstrated through application examples. Since power electronics is indispensable in hybrid vehicles, the issue of numerical oscillations in dynamic simulations involving power electronics is briefly addressed. Modelling methods such as physics-based Resistive Companion Form technique and Bond Graph method are presented with powertrain component and system modelling examples.

Keywords : Hyperheuristic ; Energy Management Strategy (EMS); Split Plug-In Hybrid Electric Vehicle (PHEV).

ACKNOWLEDGMENT

This research study is supported by Ministry of Higher Education Malaysia (MoHE) and Universiti Malaysia Pahang under Fundamental Research Grant Scheme #RDU 170129.