Abstract

Increasing the concern about the fuel economy and vehicles emissions, has led to finding alternatives for conventional engine-powered vehicles. A hybrid vehicle (HV) is one of the most promising alternatives for a conventional engine-powered vehicle which has been considered in recent years. The hybrid vehicles encompass two or more energy converters to generate the power required to drive the vehicle. Hybrid electric vehicle (HEV) is a kind of hybrid vehicle which uses a combination of electric motor and another power source such as an internal combustion engine (ICE). Due to the dual-power-source nature of the HEVs, proper management of the power flow and distribution of torque is a critical issue in the implementation of these vehicles. This task is performed by HEV control strategy. Perfectly design and control of HEV leads to an improvement in fuel economy, emissions, performance and drivability of the vehicle. In this thesis, an optimal control strategy is designed for the HEV. Here applying an adaptive control strategy base on traffic condition recognition and prediction is investigated. First, designing of optimal control strategy base on genetic-fuzzy approach is introduced and the influence of the traffic conditions on the HEV controller is studied. Then, traffic condition recognition base on driving date is explained and Markov chain modelling is used for traffic condition prediction. It is demonstrated that traffic condition affects the optimization process of HEV power management system and changing the traffic condition, alters the optimal control strategy. In the other words, a controller optimized for a special traffic condition is not optimal for another traffic condition necessarily. Finally some simulation results are presented to demonstrate the effectiveness of the proposed adaptive control strategy base on traffic condition for reducing the HEV fuel consumption and emissions.