Study of Parallel Hybrid Electric Power System

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ABSTRACT

This research has designed a new hybrid electric system, which is characterized by two mechanisms: internal combustion engine energy distribution mechanism and dual energy integration mechanism. The internal combustion engine energy distribution mechanism comprises first pulley set and second pulley set, whereby it ’ s possible to adjust its radius ratio and change the output load to road surface, output speed and corresponding load to maintain an optimal operating state of engine in a given generator rotational speed. In this way, engine energy can maintain the engine in an optimal state. For dual energy integration mechanism, any power source can be individually actuated by electric motor and the power transmitted from internal combustion engine energy distribution mechanism. Moreover, a one-way clutch can prevent the actuated power source from reversion, so any output power source will not be affected by another inactive power. Also, two input power sources can be integrated into a bigger power source via dual energy integration mechanism, thus resulting in twice the output energy and obtaining necessary tractive power. A dynamic equation is therefore derived from this system to obtain the flow direction of power source. Furthermore, dynamic equations of various system components can be established by modularized software Matlab/simulink, and fuzzy logic is used to control and develop this system ’ s dual energy integration mechanism as a control strategy. It can viibe learnt from system simulation that, after the engine energy is distributed by the controller of dual energy integration mechanism, subjected to deceleration ratio of first pulley set of internal combustion engine distribution mechanism and added to generator torque transmitted from second pulley set, the engine can maintain an optimum state under various operating conditions.

Keywords : internal combustion engine energy distribution mechanism, Dual energy integration mechanism, optimum state, hybrid electric system

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