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Study on Series Motor Four Quadrants DC Chopper Operation Controlled by an Expert System

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Abstract:

DC drive electric vehicles will have several driving conditions such as driving on a flat surface, climbing a steep hill, or cruising downhill with different types of loads, i.e., passengers and luggage. A four quadrants DC chopper (FQDC) has been developed to work with a series motor for the application of DC Drive electric vehicle in previous work, capable of operating in such driving conditions and offers several types of chopper operation modes, such as driving and reverse, regenerative and resistive braking, generator mode, field weakening, and series-parallel drive. For the FQDC to operate in the methods as mentioned earlier, it requires a control algorithm that can process input signals such as signals from the accelerator pedal, brake, speed, torque, voltage, current, load, SOC, etc., and choose the most suitable chopper operation mode. Hence, this paper describes an expert system control algorithm as the chopper operation controller. The control algorithm has been simulated in MATLAB/SIMULINK. Results showed that the controller could handle several modes of operation, for different types of driving patterns, battery SOC, and loads.

