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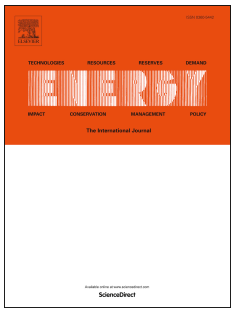

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The Influence of Driving Cycle Characteristics on the Integrated Optimization of Hybrid Energy Storage System for Electric City Buses

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Abstract—This paper analyzes the influence of different driving cycles on the integrated optimization of hybrid energy storage system, including the optimization of supercapacitor size and energy management strategy for the electric vehicle application. The driving cycle is divided into micro-trips, and a fuzzy pattern recognition algorithm is proposed to distinguish different micro-trips within a driving cycle. The intensity factor indicates how intensely the micro-trip drains energy from the hybrid energy storage system. The distribution of each driving cycle is analyzed by the probability density function. The integrated optimization of the hybrid energy storage system is conducted based on four driving cycles. Simulation results show that for different driving cycles, the optimal supercapacitor size and the on-line energy management strategy are directly determined by the maximum intensity factor. The driving cycles with similar maximum intensity factors can use same amount of supercapacitor modules and employ the same on-line energy management strategy. Therefore, the optimization results can be easily generalized to practical bus lines.