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(57) Abstract :
This study presents the development of a novel bidirectional DC/DC converter system tailored for hybrid vehicles, integrating dual-battery energy storage to optimize energy management. Traditional hybrid systems often face limitations in energy efficiency and power distribution due to reliance on single battery packs. To address these challenges, we propose a bidirectional converter system that facilitates efficient energy transfer between two distinct battery packs and the vehicle's electrical system. By employing advanced control algorithms, the system maximizes energy efficiency during both charging and discharging cycles, enhancing overall vehicle performance .Key features of the proposed system include seamless power distribution control, robust component design for reliability under diverse operating conditions, and integration capabilities addressing thermal management and electromagnetic compatibility issues. Furthermore, the system incorporates monitoring sensors for real-time feedback on voltage, current, and temperature, enabling preemptive fault detection and ensuring safe operation. The integration of dual-battery energy storage with bidirectional DC/DC conversion represents a significant advancement in hybrid vehicle technology, promising improved energy efficiency, enhanced performance, and greater sustainability. This study contributes to the ongoing efforts in developing innovative solutions for efficient and eco-friendly transportation systems.

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