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(57) Abstract :

The present invention introduces a Hybrid Quantum Whale Optimization Algorithm (HQWOA)-Optimized Power Converter for Electric Vehicles (EVs), designed to enhance energy efficiency, power conversion performance, and system stability. The invention employs a hybrid optimization approach by combining the quantum-enhanced whale optimization technique with traditional optimization algorithms, fine-tuning key power converter parameters such as switching frequency, duty cycle, inductor, and capacitor. The optimized converter achieves a remarkable efficiency of 97%, significantly reducing energy losses. The adaptive control mechanism ensures real-time adjustments based on load conditions, maintaining a stable output voltage with minimal ripple. Additionally, a robust thermal management system is incorporated to prevent overheating, ensuring safe and reliable operation. This power converter also integrates an energy storage system with a feedback loop, enabling optimized battery charging and enhancing the overall lifespan of EV batteries. The invention provides an efficient, reliable, and scalable solution for power conversion in electric vehicles, improving performance while minimizing operational costs.

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