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Numerical Analysis of Novel Battery Cooling System for Electric Vehicles

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Abstract: *Reducing emissions in the transport sector is crucial for mitigating the impact of global CO2 emissions. This study focuses on plug-in hybrid electric vehicles (PHEVs), which offer a promising alternative to traditional fossil fuel-powered vehicles. PHEVs possess varying levels of electrification, with some models equipped with a sufficiently large battery to enable pure electric driving. The cooling system in PHEVs plays a critical role in maintaining optimal temperatures for various components, including the cabin, engine, electrical motor, and battery, all of which generate heat during operation.This research aims to conduct a comparative study of an indirect cooling system, which is a commonly employed solution for cooling battery packages in PHEVs. The study identifies potential areas for improvement in the existing cooling system, specifically focusing on enhancing heat transfer from the battery module to the coolant. By enhancing heat dissipation capabilities, the proposed improvements seek to optimize the cooling system's effectiveness in regulating battery temperatures and overall vehicle performance.To achieve this objective, the study employs a comprehensive analysis, including experimental investigations and theoretical assessments. The experimental evaluations involve assessing the performance of the existing indirect cooling system under various operating conditions. These findings are then used to identify potential bottlenecks and limitations in heat transfer within the system. Based on these observations, the research proposes modifications and enhancements to improve the cooling system's efficiency.The results of this study will contribute to the ongoing efforts to optimize the design and performance of cooling systems in PHEVs. By improving the heat transfer from the battery module to the coolant, the proposed enhancements aim to enhance overall vehicle efficiency, extend battery life, and reduce energy consumption. Ultimately, this research strives to support the transition towards more sustainable transportation solutions by addressing a critical aspect of PHEV technology: the cooling system for battery packages.*

Keywords: Electric Vehicle

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