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Performance of an Automotive Air Conditioning System with the variation of state-of-charge of the storage battery

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Highlight

- Effect of battery SOC on an automotive air conditioning system is investigated.
- Charging and discharging cycles of the battery is analyzed through Simscape model.
- Characteristics of the AACS investigated over a range of battery terminal voltage.
- Discharge and suction side pressure and temperature undergo unique change.
- Appreciable deterioration in cooling capacity and COP of the system is noted.

Abstract

In an Automotive Air Conditioning System (AACS), the evaporator blower and the condenser fan are powered by a DC power supply containing a storage battery. The unique mutual interaction between the battery and the AACS, when the battery is isolated from the external power supply, has been investigated experimentally. As the prime movers draw power, the charge level of the battery falls and in turn the speed of the prime movers drops continuously. This deteriorates the performance of the condenser and the evaporator. Besides, a Matlab/Simulink based model has been developed to study the characteristics of the said electromechanical system during the charging and discharging cycles. Steady state performance

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