عنوان مقاله:

Implementation of Linear Parameter Varying System to Investigate the Impact of Varying Flow Rate on the Lithium-ion Batteries Thermal Management System Performance

محل انتشار:

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نویسندگان:

Pedram Rabiee - *School of Mechanical Engineering, Sharif University of Technology*

Mohammad Hassan Saidi - *School of Mechanical Engineering, Sharif University of Technology*

خلاصه مقاله:

Battery thermal management system is the indispensable part of the electric vehicles working with lithium—ion batteries. Accordingly, lithium-ion battery modelling,battery heat generation, and thermal management are the main focus of researchers and car manufacturers. To fulfil the need of manufacturers in the design process, a fastermodel than time—consuming Computational Fluid Dynamics models (CFD) is required. Reduced Order Models (ROM) address this requirement to maintain the accuracy of CFD models while could be compiled faster. Linear Time Invariant (LTI) reduced order model has been used in the literature: however, due to the limitation of LTI system, considering constant flow rate for the cooling fluid, a Linear Parameter Varying system with three scheduling parameters was developed in this study. It is shown that LPV system result could fit accurately to CFD result and the result is under 4% in conditions that LTI system cannot maintain accuracy. Moreover, it is shown that applying varying water flow rate could result in smoother temperature profile.

کلمات کلیدی:

lithium-ion batteries, thermal management,CFD. reduced-order model, linear parameter varying