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Thermal Investigation of Cell Arrangements for Cylindrical Battery with Forced Air-Cooling Strategy

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Abstract. The cell arrangement is one of the most crucial rules for designing an efficient cooling system of the lithium-ion battery pack in electric vehicles (EVs). Many researches studied on the design of different arrangements of the battery cell, but a few researches involved investigation of air flow with adjusting gap between cells in battery pack. Consequently, this paper focuses on decrease of the temperature of the battery pack with a simple arrangement which the space utilization and turbulent flow of the battery pack is considered for cylindrical cells. Furthermore, this paper aims to comparative analysis of different arrangements with increasing number of columns and adjusting the gap between cells for reduce temperature of battery in staggered arrangement. Parametric analysis effected on the cooling performance is studied on a cylindrical battery pack with forced air-cooling system in axial-flow configuration based on computational fluid dynamics (CFD).

Keywords: Battery pack, Battery thermal management, Computational fluid dynamics and Air-cooling strategy