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Experimental and Simulated Analysis of Lithium-Ion Battery Parameters for Electric Vehicles

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Abstract: *Electric mobility contributing to greater extent to balance the energy and power demands, energy storage units as well as environment safety for current automobile sector. Electric vehicle has major efficient features of zero combustion, longer charging and discharging cycle which plays a vital role to replace the ongoing increase in price of petroleum fuels and its harmful effect son environment with their degrading store. Many non-conventional energy sources like solar, tidal, wind etc. Can be used to generate energy and store it in suitable types of batteries to run these vehicles. The Different types of batteries like lead acid, lithium ion, nickel bromide is used as an energy storage device for these electric vehicles. But with many advantages these batteries have some structural and thermal issues if not designed or connected properly. These issues are capacity loss, cell balancing, thermal runaway, reduction in battery life etc. therefore much focus need to give on proper battery connections considering its working parameters. Possible types of connections for batteries are active, passive and semi active as per their connections in series and parallel type. These connections depend on increasing the voltage and capacity of the battery. For series combinations apposite terminals of batteries are connected to each other, in which current remains constant and battery voltage is summed up to increase for maintaining the same capacity or ampere hour (Ah) rating of batteries. Whereas in parallel connections same terminals of the batteries are connected to each other in which voltage remained constant and battery current is summed up to rise. This is needed when we need to double the battery capacity or ampere hours (Ah) rating according to your system needs while maintain the same level of voltages. Each connections have its significance for battery performance. The present work focused on various design parameters of electric vehicle i.e., Comparative analysis of both series and parallel connection of batteries through its circuit connection, active and passive cell balancing of battery cells. This analysis will be carried out in Experimental with simulation study using by analyzing the behavior of it on battery performance characteristics such as state of charge, voltage and current variation as per load cycle.*

Keywords: E-mobility, Types of Batteries, Series and Parallel Connections, State of Charge, Cell Balancing, etc.

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