A Study on Battery Performance in Electric Vehicles

Abstract

This paper examines the performance metrics of lithium-ion batteries used in electric vehicles (EVs). Factors like temperature, cycle count, and discharge rate were analyzed. Results show a significant drop in battery capacity at higher temperatures and after repeated charge cycles.

1. Introduction

Electric vehicles rely heavily on battery performance for range and reliability. Lithium-ion batteries, while efficient, degrade under certain conditions. This study investigates how key parameters affect battery capacity.

2. Methodology

We conducted tests across different:

- Temperatures: 0°C, 25°C, 45°C
- Charge cycles: 0, 500, 1000 cycles
- Discharge rates: 1C, 2C, 3C

3. Results

Table 1: Battery Capacity (%) at Different Temperatures

Temperature (°C)	Initial Capacity (%)
0	92
25	100
45	87

Table 2: Capacity Retention After Charge Cycles

Charge Cycles	Capacity (%)
0	100
500	91

1000	83

Table 3: Capacity at Different Discharge Rates

Discharge Rate (C)	Capacity (%)
1C	100
2C	95
3C	89

4. Conclusion

Temperature, cycle count, and discharge rate all significantly impact EV battery performance. Keeping operational temperatures moderate and using slower charge/discharge rates can prolong battery life.