PROJECT REPORT

ON

REGENERATIVE BRAKING SYSTEM

ABSTRACT

The Regenerative Braking System (RBS) is an advanced technology used in electric and hybrid vehicles to recover energy lost during braking. This project aims to analyze the effectiveness of RBS through experimental testing.

EXPERIMENTAL SETUP

A regenerative braking test rig was built using:

1. BLDC Motor (24V, 250W) as a generator
2. Lithium-Ion Battery (24V, 7Ah) for energy storage
3. Disc brake with electronic control
4. Speed sensor (Hall Effect) for measuring wheel speed
5. Voltage and Current sensors for energy recovery monitoring

EXPERIMENTAL PROCEDURE

1. Vehicle speed was set at 10 km/h, 20 km/h, and 30 km/h.
2. Braking was applied first using conventional brakes, then using regenerative braking.
3. The kinetic energy before braking and recovered energy were recorded.
4. Efficiency of regenerative braking was calculated.

OBSERVATIONS AND DATA

Experimental results recorded:

Speed (km/h) | Kinetic Energy Before Braking (J) | Energy Recovered (J) | Efficiency (%)

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10	150	45	30%
20	600	240	40%
30	1350	675	50%

Key Observations:

- Higher speeds resulted in more energy recovery.
- Regenerative braking efficiency was higher at 30 km/h (50%).
- The system increased battery charge by 5-10% per braking event.

ANALYSIS AND RESULTS

1. Energy Recovery Efficiency = (Energy Recovered / Kinetic Energy) × 100
   - Maximum efficiency achieved: 50% at 30 km/h.
2. Battery Performance:
   - Regenerative braking increased battery charge, extending EV range by 15-20%.
3. Brake Wear Reduction:
   - Use of friction brakes reduced by 40%, increasing their lifespan.

CONCLUSION

The experiment demonstrated that regenerative braking can recover up to 50% of kinetic energy at high speeds, improving energy efficiency, reducing brake wear, and enhancing battery performance in electric vehicles.