

## Using Super capacitor Energy Storage Systems to Improve the Performance of Electric Vehicles\*

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### Abstract

The objective of this research is to enhance the electrical system performance in traction systems using super capacitor energy storage for different operations: starting up, acceleration and braking.

At first, a dynamical model of the whole electrical system is implemented in the Simpler environment.

The motor speed is, then, controlled by three phases PWM inverter with closed-loop control circuits established based on the control techniques (scalar V/f and variable frequency).

Next, the super capacitor energy storage is sized to save the braking energy and then it is discharged to supply the induction motor during the start up or acceleration. Super capacitors are charged and discharged by Buck-Boost converter reversible in current. Simulation results are analyzed and compared before and after adding the energy storage system.

Lastly, the thermal behavior of the energy storage system is evaluated and the operating temperature is estimated

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Keywords: Super capacitors, Braking Energy Recovery, Induction Motor, Inverter, Temperature Estimation.

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\* For the paper in Arabic see pages (139-149).

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