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Brushless Dc Drive for Electrical Vehicle with Charging Station

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Abstract: ***The proposed model of charging station of a electrical vehicle is for the charging the battery of EV.A Charging station take an AC supply from the grid and converting into the DC with use of rectifier. This DC output from rectifier is step down by buck converter and took out a constant current to charge the battery of electrical vehicle. A PI control technique is used for controlling the constant current charging. Due to more advantages BLDC motor is used for EV. Lithium-ion/lead-acid battery of EV provide to the BLDC drive of electrical vehicle to the controlled inverter.***

I. INTRODUCTION

With increasing price of oil, petrol, diesel, natural gas and mounting environment concerns, cleaner and sustainable energy solutions have been demanded. At present transportation constitutes a large portion of the energy consumed and pollution created [2]. Electrical vehicle is the solution of those problem like consumption of natural energy resources and pollution. Electric vehicles are becoming promising alternatives to be remedy for air pollution, greenhouse gases and depletion of the fini te fossil fuel resources as they use centrally generated electricity as a power source[3]. Modelling and simulation of electric vehi cles and charging station have been emphasized.

The energy conservation from the natural resources is the one of the important issue. Also, the fuel cost getting increased day by day due to reducing the availability of fuel on earth and also pollution ratio increasing on daily bases. So, researchers are providing alternative way to protect the environment by employing the battery fed electric vehicle. In battery fed electric vehicle the battery should be charge and discharge through the Vehicle Motor. Charging station and different charging technique are required for the charge the vehicle battery [1].

II. OPEN LOOP CHARGIND STATION

A. Simulation in matlab

Electrical Vehicle charging station is the place where an EV integrates with the distribution grid. So, expert care has to be given in designing the components in the charging station [3]. In battery fed electric vehicle the battery should be charge and discharge precisely to improve the life as well as productivity of battery. To achieve this conventional Buck- Boost converter is used in Continuous conduction mode to charge and discharge the battery. This buck-boost converter is working on dc supply for that purpose we have to convert the ac supply into dc supply by diode bridge rectifier and while doing this more distortion occurred at the ac input side of supply current and power factor will get poor.

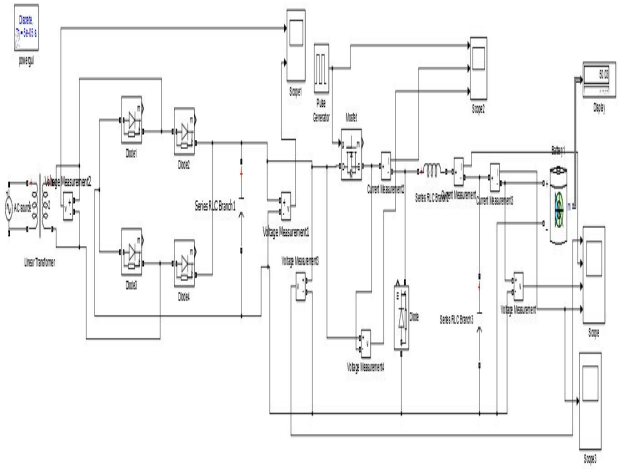


Fig.1 Simulation model of open-loop charging station

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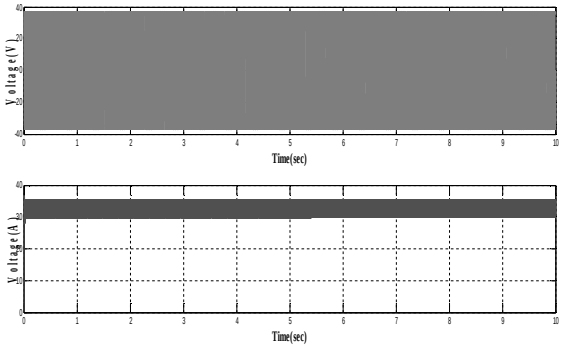


Fig.2 Rectification Waveform

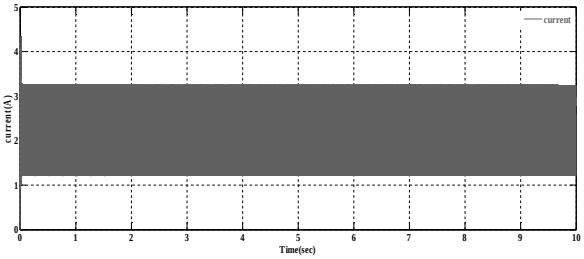


Fig.3 output current open-loop charging station

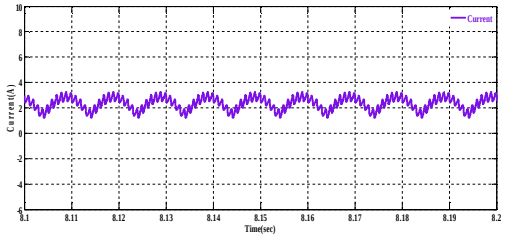


Fig.4 zoomed output current open-loop charging station

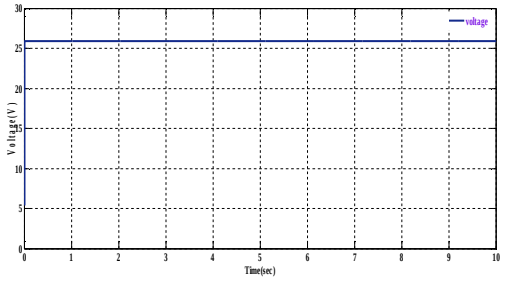


Fig.5 output voltage open-loop charging station

III. BLDC DRIVE SIMULATION IN MATLAB

A BLDC motor is one that retains the characteristics of a dc motor eliminating the commutate and the brushes. In many cases, Brushless DC (BLDC) motors can replace conventional DC motors. There are no brushes on the rotor. They are driven by dc voltage but current commutation is done by solid state switches that mean, the commutation is done electronically not mechanically. The BLDC motors are available in many different power ratings ranging from very small motors as used in hard disks to large motors in electric vehicles. BLDC motors have many advantages over brushed DC motors. here, voltage source inverter is used for convert DC supply of battery into the a AC before apply to the motor.

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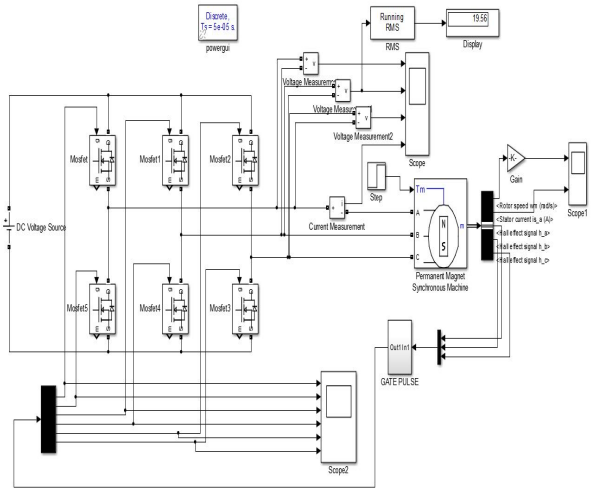


Fig.6 Simulation model of BLCD drive

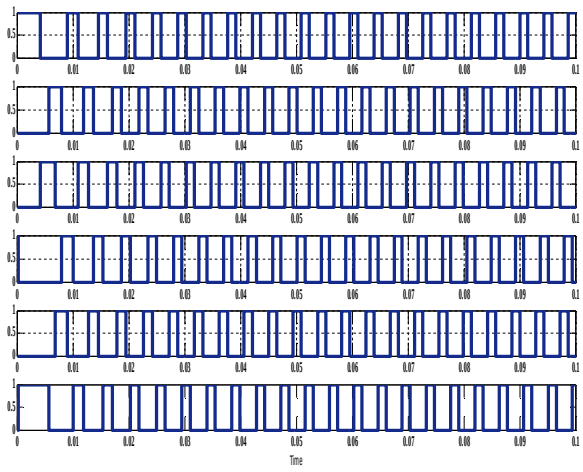


Fig.7 Gate pulse waveform

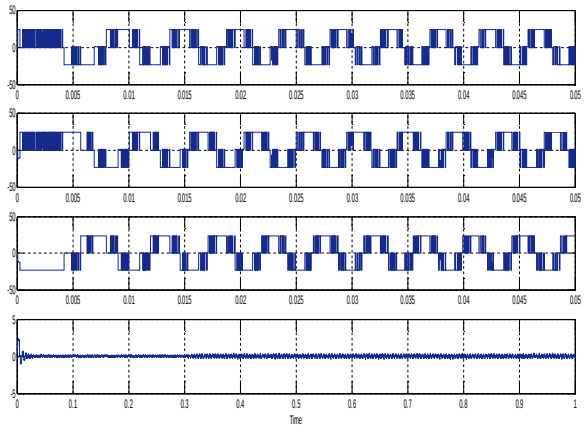


Fig.8 Inverter output voltage

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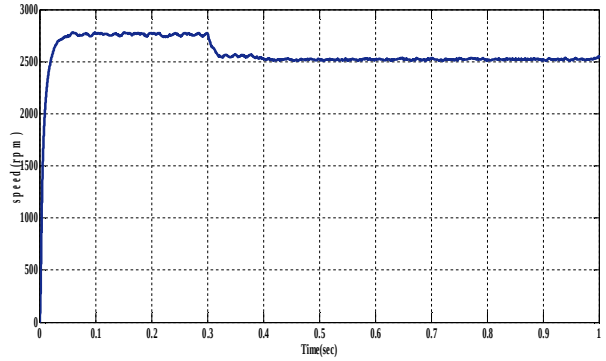


Fig.9 Speed Waveform

IV. CONCLUSION

In Electrical vehicle Battery is used as a power source for vehicle motor. So Battery has to be recharg regularly. A constant current constant voltage is required for battery charging. In simulation of charging station a constant current and constant voltage is achieved with the use of PI controller.In BLDC drive simulation a hysteresis current control technique is used for a control a applied motor current for control a speed of BLDC motor.

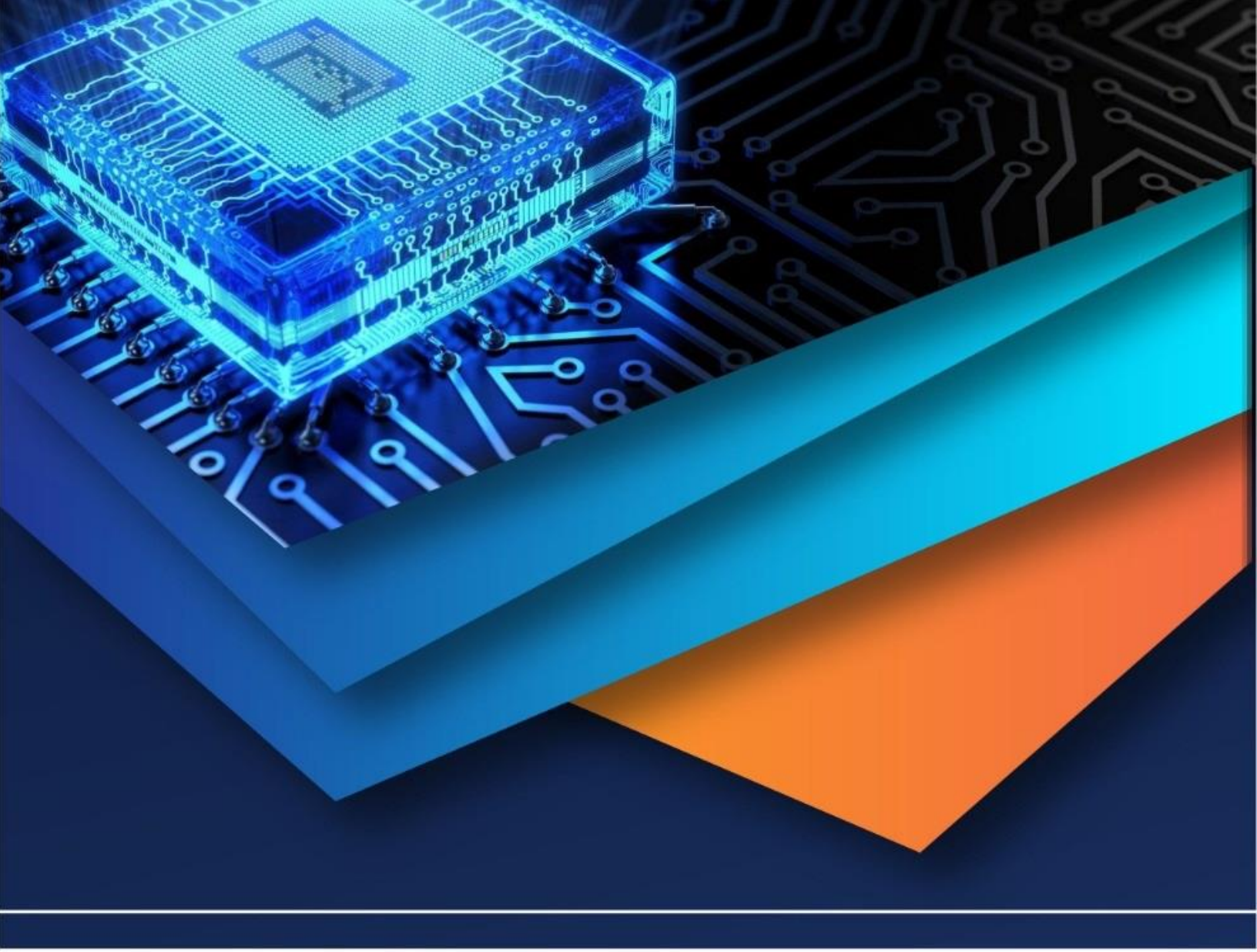
V. FUTURE WORK

For controlling a speed of BLDC motor which is change with the applied load a PI controller will use. And will get a synchronous speed with reference to change of load.

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