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LIST OF ABBREVIATIONS

DC – Direct Current

AC – Alternating Current

EV – Electric Vehicle

CC – Constant Current

CV – Constant voltage

SOC – State Of Charge

MSRP – Manufacturer's Suggested Retail Price

CHAdemo – Charge de Move

CCS – Combined Charging System

Vdc – Volt's Direct Current

MOSFET – Metal Oxide Semiconductor Field Effect Transistor

MUX – MultiplexerS

DEMUX – Demultiplexer

PID – Proportional Integral Derivative Controller

PWM – Pulse Width Modulation

RLC circuit – Resistor Inductor Capacitor Block

ABSTRACT

Due to environmental problems in the world, the need for electric vehicles is increasing. While the transition to Electric Vehicles continues, the acceleration of this process plays an important role in reducing environmental problems. In order to accelerate this transition, charging units should become widespread and charging time should be reduced. Higher power charging units are needed to reduce charging time. This is where DC (Direct Current) fast charging units come into play.

In this study, the charging process of electric vehicles, the behavior of the DC fast charging unit on the battery and the control systems are modeled in MATLAB/Simulink environment. The designed model represents the electric vehicle battery charging system that will charge electric vehicles by using DC fast Charging System. The simulation is integrated according to the DC level-3 charging conditions. The system model consists of three phase power source, 1 AC (AC Current)/DC converter, 1 buck converter and controlling algorithms to charge electric vehicles and EV batteries. The system model includes the design methods (AC/DC-DC/DC) design and different control strategies) and descriptions of these components.

The simulation result shows that the EV battery is charged with Constant Current (CC) charging when battery SOC is less than 80%. Constant Voltage (CV) charging method is used to charge the battery when SOC of battery is more than 80%. This is done to avoid overcharging of battery which further reduces battery life. Thus, it offers positive outputs about the integration of DC fast charging units, which will increase rapidly in the future, into the power system and how this process should be established. DC fast charging is the future of charging infrastructure and it will also give boost to adoption of EVs.