Battery performance vienna

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Further information for all the levels of charging is provided in Table 1. As a test case, the Nissan Leaf(R) 24 kWh Li-ion battery pack is considered [14].

The review of available Level 3/DC fast-charging techniques is the cornerstone of this paper. The advantages and limitations are also highlighted for better clarity.

Generally, DC fast-charging stations for EVs are designed to supply about 50 kW of power [15]. The established trend is to place these chargers off-board as these stations are bulky. The general block diagram of a DC fast-charging station is shown in Fig. 1, and the charger is connected to a common AC link.

General block diagram of DC fast-charging station

EV battery chargers can be integrated into an EV as an on-board charger or separated as an off-board charger. The power flows between the grids, and EV batteries can be unidirectional or bidirectional. The unidirectional power flow chargers are used as grid-to-vehicle charger applications, and bidirectional power flow chargers are used as grid-to-vehicle and vehicle-to-grid charger applications [16]. Unidirectional chargers can be controlled to charge the EV battery from the grid [17,18,19].

As per the previous review papers [20,21,22,23,24,25], they have reviewed two-level AC-DC converters, conventional boost rectifier, zero-voltage transition (ZVT) converters, zero-current transition (ZCT) converters, ZVT-ZCT converters, interleaved boost PFC converters, bridgeless boost PFC converters, and bridgeless interleaved boost PFC converters for the EV charging stations based on the efficiency, power factor, and input current THD and this paper reviews the practical viability of the energy-efficient converters based on the efficiency, power factor, power density, input current THD, and simulation analysis of Vienna rectifier for EV charging stations is carried out.

This paper presents a review of the recent battery-charging infrastructure for EVs in terms of converter topologies and power control strategies. From the analysis, the suitable converter has selected and simulated with a suitable controller based on the requirement of DC fast charger. In addition, three topologies of Vienna rectifier have been simulated. Based on the results of input current harmonics, output voltage, output current, and efficiency of three topologies of Vienna rectifier are analysed, and the graphs are plotted.

There are several numbers of converter topologies available for the rapid charging of batteries or ultra-capacitors. Some feasible options are highlighted in this paper. They are:

The unidirectional boost converter is shown in Fig. 2, and these converters are employed where the output voltage has to be boosted up for loads which require higher voltage [26].

Unidirectional boost converter [26]

The primary goal of using a boost converter instead of the conventional diode bridge rectifier is to improve power factor, to reduce the harmonics at the end, and to have a controlled DC voltage at the output if unwanted perturbations occur at the AC end.

The SWISS rectifier is shown in Fig. 3, and these rectifiers are employed where the efficiency has to be increased based on the application requirements [27].

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