TECHNOLOGY

Level-3 Integrated On-board Electric Vehicle Battery Charger

OVERVIEW

Background:
Two major types of plug-in electric vehicle battery chargers are: on-board chargers and off-board chargers. Onboard chargers provide flexibility of charging batteries using single-phase power outlets; however, they contribute to additional weight, volume and cost of the car. Due to their charging power limitations and slow charging process, it would take between 4 to 20 hours to fully charge a PEV battery using conventional level-1 and level-2 onboard chargers. On the other hand, off-board chargers are capable of high-power fast charging. However, they are large, expensive and require a comprehensive evolution of national charging infrastructure. A high-power charger without a need for additional bulky onboard or off-board power electronic interfaces (PEIs) is an enabling solution which not only provides onboard fast charging without additional cost and weight, but also alleviates the range anxiety issues among plug-in electric vehicle owners.

Innovation:

Researchers at the University of Maryland have developed an onboard approach for both single-phase and three-phase grid-connected integrated chargers onboard fast charging using an ac propulsion machine and its inverter. The bi-directional operation of inverter allows the integrated charger to charge batteries at the rated power of the propulsion machine. The proposed topologies are simple in spite of their elegance as they reduce the complexity of the system while for the first time enabling high-power onboard charging without a need for any additional passive and bulky components, except a few compact semiconductors.

APPLICATIONS

Plug-in electric vehicles

ADVANTAGES

Low cost
High-power fast charging
Very simple structure

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PATENT STATUS

Pending

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CATEGORIES

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- Power Electronics

EXTERNAL RESOURCES

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