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Experimental Investigation on Magnetic Concrete for Wireless Charging

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Abstract: *This paper proposes methods of predicting and preventing thermal failure within high-power ferrite structures of electric vehicle (EV) wireless charging inductive power transfer (IPT) by improving their ferrite layouts. A high-power IPT magnetic design suitable for wirelessly charging an EV at 50 kW using a heuristic approach is presented where the chosen design achieves reduced heating within the magnetic structure. Recommendations are made that both avoid ferrite fracturing due to magnetic hotspots and cause temperature differentials across ferrite tiles, and regarding airgap distribution between ferrite tiles to reduce loss-inducing circulating flux within the ferrite structure without reducing coupling*

Wireless charging is an attractive option of energy replenishment for electric vehicles (EVs) as it does not require direct electrical contact to the EVs. However, the radiated magnetic field from the EV wireless charging system can be an electromagnetic compatibility (EMC) concern nearby electrical and electronic devices. This paper investigates the influence of the power level, the clearance, and offset between coils on the radiated magnetic field emitted from the wireless charging system. The experimental study shows that these variable parameters can affect the radiated magnetic field level and the field distribution, which provides valuable input for standardization of the test setup and working condition of the EV wireless charging system.

Keywords: electric vehicle

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