

## **Development of the Estimating Method of Low-frequency Return-current of DC Electric Railcar**

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Estimation of the harmonic current of railcars is necessary for achieving electromagnetic compatibility (EMC) between train signaling systems and railcars. However, no estimation method had accounted for low-frequency return-current of DC electric railcars at a frequency less than the power converter's carrier frequency. This paper describes a new method estimating the spectrum of the low-frequency return-current of DC electric railcars. This method requires only characteristics of the DC electric railcars, such as train mass and acceleration. Measurement results in this report have indicated effectiveness of the developed estimation method clearly.