

Is capacitor capacitance estimation a problem in railway applications?

Currently, there is a big challenge for capacitor capacitance estimation in railway applications. The noise fluctuation of the voltage sensor may be nearly equal to that of ripple voltage, leading to the considerable errors of the existing capacitor condition monitoring methods.

How is capacitance estimated?

The capacitance is estimated by the zero-crossing point voltage and current. There are various research results on methods of estimating ESR, too. There is a technique for estimating the ESR by calculating the intermediate frequency band value extracted using the bandpass filter.

How do you calculate a capacitor's capacitance?

One involves using data from the system related to the capacitor, and the other involves using the direct data of the capacitor. First, when using capacitor-related system data, the capacitance is estimated using the root mean square of input and output data and capacitor voltage of one phase of a three-phase back-to-back converter [8, 9].

What is deep learning in capacitor estimation?

Deep learning is a process in which an algorithm learns the characteristics of data and its answers by itself through a large amount of data. In this study, the process of analyzing the characteristics of complex relationship data and finding a solution was applied to the field of capacitor estimation.

Which capacitor has the best performance?

As a result, the performance was analyzed, as shown in Table 5. Combinations C, D, and E can similarly be said to have the best performance; however, among them, C is judged to have the best performance. The reason is that the performance of Test 3 is important for estimating the ESR, which increases as the capacitor ages.

How to estimate the state of a capacitor using a DNN?

To estimate the state of a capacitor using a DNN, data that have a high correlation with the estimated value should be used as an input to the DNN. Therefore, data having a high correlation with capacitance and ESR were analyzed based on the frequency characteristics of capacitors.

Capacitance and tan ... Therefore, in the lifetime estimation of a capacitor, it is necessary to consider not only the temperature acceleration factor K_T but also the ripple acceleration factor K_R , which takes into account the increase in internal temperature due to the ripple current. Capacitor Generation of Heat Due to Ripple Current and Core Temperature. Capacitors have ...

This will lead to the circuit performance degradation and even capacitor failures. Therefore, the capacitance

estimation of DC-link capacitors is necessary and of great significance to the safe ...

The core metrics used to evaluate the performance of supercapacitors are capacitance, resistance, cycle life, energy density, power density, etc. However, researchers are more concerned with predicting capacitance and lifecycles of supercapacitor due to its significance for selecting suitable supercapacitor materials, planning ...

In this article, an effective capacitance estimation method is proposed to solve these problems. The precharging process is analyzed and an estimation model is built to weaken the impact of ...

Block diagram of capacitor voltage estimation and capacitance monitoring processes. According to Fig. 5, ... Following an initial evaluation of the converter's performance in MATLAB Simulink using the proposed methods, the accuracy of the operation has been assessed on a lab prototype in various scenarios using the parameters listed in Table 4. The lab ...

This study proposes an algorithm to estimate the state of an input capacitor based on a deep neural network (DNN). This algorithm runs in a DC/AC single-phase ...

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In this article, an effective capacitance estimation method is proposed to solve these problems. The precharging process is analyzed and an estimation model is built to weaken the impact of the sensor noise. Based on the model, a three-stage iteration algorithm is used for capacitance estimations, which can effectively search for the optimal ...

In this paper, we estimate the DC/AC 3-phase converter input capacitor using a deep learning algorithm and compare its performance. In addition, to test the performance of ...

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Capacitors are available in a wide range of capacitance values, from just a few picofarads to well in excess of a farad, a range of over 10^{12} . Unlike resistors, whose physical size relates to their power rating and not their resistance value, the physical size of a capacitor is related to both its capacitance and its voltage rating (a consequence of Equation ref{8.4}). Modest surface ...

In the present study, for the first time, the experimental data from more than 300 published papers have been extracted and then analyzed through an optimized support vector machine (SVM) by a grey wolf optimization (GWO) algorithm to obtain a correlation between carbon-based structural features and EDLC performance.

In this work, the capacitance of carbon-based EDCLs is accurately predicted as a function of specific surface area, calculated pore size, ID / IG ratio (ratio of the D-band (at 1360 cm⁻¹, which reflects the amorphous carbon and the defects) and G-band (at 1570 cm⁻¹, which indicates the existence of the sp² hybridized carbon) in Raman spectroscopy...

Performance Estimation (Teaching Material is from chapter4) zResistance Estimation zCapacitance Estimation zSwitching Characteristics zInverter-pair delay zDriving Large Capacitive Loads zDynamic Power Dissipation zScaling of MOS Transistor Dimensions Tai-Haur Kuo, EE, NCKU, 1997 VLSI Design 4-1. Resistance Estimation zSheet Resistance Current t L ...

In this paper, we estimate the DC/AC 3-phase converter input capacitor using a deep learning algorithm and compare its performance. In addition, to test the performance of the deep learning algorithm according to the characteristics of the input data, three input data conditions and four deep learning algorithms were used. Capacitor ...

Accurate capacitance estimation is critical to the condition monitoring of DC-link capacitors, which is also the basis of online capacitor life prediction. Currently, there is a big challenge for capacitor capacitance estimation in railway applications.

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