

Online estimation of lithium-ion battery capacity using surrogate model based on electrochemical model

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As electric vehicles become popular, the use of lithium-ion batteries is increasing. However, it is difficult to ensure the reliable use of the battery because the state of charge (SoC) of a lithium-ion battery cannot be measured directly. The SoC of the battery is necessary to accurately determine the remaining distance an electric vehicle can travel. Therefore, it is necessary to study how to estimate the SoC of the battery in real-time. As methods for estimating SoC, equivalent circuit model, electrochemical model, and recently artificial neural network-based model are being studied. The electrochemical model is not suitable for real-time use due to its high computational complexity. To overcome these limitations, in this study, an electrochemical model-based surrogate model was presented and compared with the Long short-term memory (LSTM) model, which is a data-driven model in terms of computational complexity and accuracy.