

Online Battery Equivalent Circuit Model Estimation on Continuous-Time Domain Using Linear Integral Filter Method

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Abstract : Equivalent circuit models (ECMs) are widely used in battery management systems in electric vehicles and other battery energy storage systems. The battery dynamics and the model parameters vary under different working conditions, such as different temperature and state of charge (SOC) levels, and therefore online parameter identification can improve the modelling accuracy. This paper presents a way of online ECM parameter identification using a continuous time (CT) estimation method. The CT estimation method has several advantages over discrete time (DT) estimation methods for ECM parameter identification due to the widely separated battery dynamic modes and fast sampling. The presented method can be used for online SOC estimation. Test data are collected using a lithium ion cell, and the experimental results show that the presented CT method achieves better modelling accuracy compared with the conventional DT recursive least square method. The effectiveness of the presented method for online SOC estimation is also verified on test data.

Keywords : electric circuit model, continuous time domain estimation, linear integral filter method, parameter and SOC estimation, recursive least square

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