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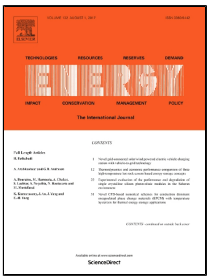

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State of charge estimation of lithium-ion batteries using a grey extended kalman filter and a novel open-circuit voltage model

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Abstract

In this study a grey extended Kalman filter and a novel open-circuit voltage model for the estimation of the state of charge of lithium-ion batteries are presented. To eliminate the influence of truncation error, this study utilizes a grey prediction model to deal with the state prediction problem. In order to further improve the accuracy of state of charge estimation, a novel open-circuit voltage model based on cubic-Hermite interpolation is also proposed to update the state estimate. Moreover, the accuracy of the proposed open-circuit voltage model is verified in terms of the following two aspects: capacity estimation and state of charge estimation. The accuracy and convergence of the grey extended Kalman filter is analyzed for different types of dynamic loading conditions, including the Urban Dynamometer Driving Schedule and the New European Driving Cycle. The experimental results show that the proposed approach offers good accuracy for the estimation of the state of charge.