Remaining Useful Life Assessment of Lithium-ion Battery based on HKA-ELM Algorithm

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Accurately predicting the remaining useful life (RUL) of lithium-ion batteries is very important to battery management systems (BMS). Recently, Extreme Learning Machine (ELM) algorithm has been applied to RUL prediction of lithium-ion batteries. However, the input weights and biases of the ELM algorithm are generated randomly, which affect its prediction accuracy. In this paper, we use the heuristic Kalman algorithm (HKA) to optimize the input weights and biases of the ELM algorithm. The mean square error (MSE) obtained from the ELM is used as the cost function of the HKA algorithm, and the optimized particles in the HKA are used as the weights and biases of the ELM predictor. In this work, the HKA-ELM method is introduced firstly, then, we perform experiments on the battery data set to verify the proposed algorithm, and compare with other algorithms. Results show that our proposed method has better prediction accuracy than related works.

Keywords: Lithium-ion battery, RUL prediction, ELM, HKA

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