

Life Prediction Method of Lithium-Ion Battery Based on Grey Support Vector Machines

Authors : Xiaogang Li, Jieqiong Miao

Abstract : As for the problem of the grey forecasting model prediction accuracy is low, an improved grey prediction model is put forward. Firstly, use trigonometric function transform the original data sequence in order to improve the smoothness of data , this model called SGM(smoothness of grey prediction model), then combine the improved grey model with support vector machine , and put forward the grey support vector machine model (SGM - SVM).Before the establishment of the model, we use trigonometric functions and accumulation generation operation preprocessing data in order to enhance the smoothness of the data and weaken the randomness of the data, then use support vector machine (SVM) to establish a prediction model for pre-processed data and select model parameters using genetic algorithms to obtain the optimum value of the global search. Finally, restore data through the "regressive generate" operation to get forecasting data. In order to prove that the SGM-SVM model is superior to other models, we select the battery life data from calce. The presented model is used to predict life of battery and the predicted result was compared with that of grey model and support vector machines. For a more intuitive comparison of the three models, this paper presents root mean square error of this three different models .The results show that the effect of grey support vector machine (SGM-SVM) to predict life is optimal, and the root mean square error is only 3.18%.
Keywords: grey forecasting model, trigonometric function, support vector machine, genetic algorithms, root mean square error

Keywords : Grey prediction model, trigonometric functions, support vector machines, genetic algorithms, root mean square error

Conference Title : ICPHM 2015 : International Conference on Prognostics and Health Management

Conference Location : London, United Kingdom

Conference Dates : May 25-26, 2015