Estimation of lithium-ion battery states using moving-horizon parameter estimation method

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The renewable energy is one of the core research subjects for preventing global warming and energy shortage. Also, the renewable vehicle systems such as hybrid electric vehicle (HEV) or plug-in hybrid electric vehicle (PHEV) are one of the most promising technologies. There is need for power storage systems such as lithium-ion battery. In this study, lithium-ion battery for hybrid electric vehicle is selected as target system. In battery system, there are two parameters for representing of battery states – capacity fading and power fading. Two parameter estimation models are suggested for online estimation of parameter values. In this model, battery system model is suggested with reduced battery system model. The parameter estimation model is a hybrid model of data reconciliation and moving-horizon penalty method for parameter estimation. This moving penalty term is for slow aging mechanism of battery. The nonlinear programming method is selected for solving the optimization problem. This method is demonstrated using aged battery system.