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Improving the life-cycle of lithium-ion battery packs to support wind renewable fluctuation

Kamyar Mehran

Queen Mary University of London, UK

Predicting and enhancing the life-cycle of lithium-ion battery packs has been the subject of studies towards the large-scale use of storage systems to store electrical energy during fluctuations and unpredictable behaviour of wind renewable. Battery pack is a group of cells which are placed in a parallel, series or matrix form to provide the required power. Life cycle prediction of a single cell is challenging due to the complexity of electrochemical reactions, thermal variability and the formation of SEI (solid electrolyte interphase) layers. Cell interconnections make the prediction more challenging as the electrical dynamics and thermal characteristics of each cell is different from the others. This work introduces random variability where the aging of a single cell propagates and reduces the life of the whole pack. The use of accurate electro-chemical modelling and wireless sensor/antenna system in real-time estimation of the critical cell parameters, i.e. state-of-the-charge (SOH), state-of-health (SoH), internal resistance, and temperature variation are investigated. The integrated system will significantly suppress the aging propagation and enhance the life-time of the pack.

Biography

Kamyar Mehran received his PhD Degree in Newcastle University, UK in 2009. He is a Lecturer in Power Engineering at the Queen Mary University of London, UK. He has worked at the University of Warwick, Newcastle (UK) as a Research Fellow (2013-2015), University and Imperial College London (UK) (2010-2013) as a Research Associate and commercialization Manager for a spin-off company, OptoNeuro Ltd. Prior to his academic career, he collected over 8 years of industrial experience in companies like Sun Microsystems (Oracle), and National Iranian Oil Company. His current research interests include nonlinear dynamics, intelligent control/optimization of energy storage systems, high-switching power electronic converters, and home energy management systems.

k.mehran@qmul.ac.uk

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