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POWER MANAGEMENT STRATEGY OF A HYBRID DISTRIBUTED GENERATION SYSTEM

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ABSTRACT

This paper presents novel hierarchical control architecture for a hybrid distributed generation system that consists of a battery and a solid oxide fuel cell. The overall aim is to optimize the power flow of this hybrid generation system for different modes of operation while taking into account component and system constraints. The proposed method uses an advance supervisory controller in the first layer which captures all of possible operation modes. This layer has been developed by the Stateflow® toolbox and it provides a proper supervisory environment for this complex structure. In the second layer, an advanced fuzzy controller has been developed for optimal power splitting between battery and fuel cell. With regards to the operation modes, the upper layer makes decision to choose the switching chain rules and corresponding controller in the second layer. Finally in the third layer, there are local controllers to regulate the set points of each subsystem to reach the best performance and acceptable operation indices. Simulation results of a test system illustrate improvement in the operation efficiency of hybrid system and the battery's state of charge has been maintained at a reasonable level.