World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:15, No:12, 2021

Energy Management System with Temperature Rise Prevention on Hybrid Ships

Authors : Asser S. Abdelwahab, Nabil H. Abbasy, Ragi A. Hamdy

Abstract : Marine shipping has now become one of the major worldwide contributors to pollution and greenhouse gas emissions. Hybrid ships technology based on multiple energy sources has taken a great scope of research to get rid of ship emissions and cut down fuel expenses. Insufficiency between power generated and the demand load to withstand the transient behavior on ships during severe climate conditions will lead to a blackout. Thus, an efficient energy management system (EMS) is a mandatory scope for achieving higher system efficiency while enhancing the lifetime of the onboard storage systems is another salient EMS scope. Considering energy storage system conditions, both the battery state of charge (SOC) and temperature represent important parameters to prevent any malfunction of the storage system that eventually degrades the whole system. In this paper, a two battery packs ratio fuzzy logic control model is proposed. The overall aim is to control the charging/discharging current while including both the battery SOC and temperature in the energy management system. The full designs of the proposed controllers are described and simulated using Matlab. The results prove the successfulness of the proposed controller in stabilizing the system voltage during both loading and unloading while keeping the energy storage system in a healthy condition.

Keywords : energy storage system, power shipboard, hybrid ship, thermal runaway
Conference Title : ICIOEE 2021 : International Conference on Innovations in Offshore Electrical Engineering
Conference Location : Cairo, Egypt
Conference Dates : December 13-14, 2021