A Teaching Learning Based Optimization for Optimal Design of a Hybrid Energy System

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Abstract : This paper introduces a method to optimal design of a hybrid Wind/Photovoltaic/Fuel cell generation system for a typical domestic load that is not located near the electricity grid. In this configuration the combination of a battery, an electrolyser, and a hydrogen storage tank are used as the energy storage system. The aim of this design is minimization of overall cost of generation scheme over 20 years of operation. The Matlab/Simulink is applied for choosing the appropriate structure and the optimization of system sizing. A teaching learning based optimization is used to optimize the cost function. An overall power management strategy is designed for the proposed system to manage power flows among the different energy sources and the storage unit in the system. The results have been analyzed in terms of technics and economics. The simulation results indicate that the proposed hybrid system would be a feasible solution for stand-alone applications at remote locations.

Keywords : hybrid energy system, optimum sizing, power management, TLBO

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