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Optimal sizing design and energy management of stand-alone photovoltaic/wind generator systems

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Abstract

Presently, the photovoltaic (PV) and the wind energies are the most important energetic alternative resources. So far, a lot of researches are developed and conducted concerning the cost-optimally design and energy management for the stand-alone hybrid PV-wind generator (WG) systems. In this study, a methodology for optimal sizing design and strategy control based on differential flatness approach is applied to the hybrid stand-alone PV-WG systems. The purpose is to find the optimal number of units ensuring that the 20 years round total system cost is minimized subject to the constraint that the load energy requirements are completely covered. The optimization methodology, using the genetic algorithm and the formulation of the problem are detailed. Finally, an optimal configuration is obtained with a lifetime of 20 years; also the results of the control algorithm based on the flatness properties obtained under Matlab/Simulink are given.

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Keywords: Design; Genetic algorithm; Hybrid source; Optimization; Photovoltaic; Stand-alone; total system cost; wind energy;flatness control.

1. Introduction

The managing between generation periods of renewable resources and consumption periods is very convoluted issue in stand-alone photovoltaic (PV) and Wind Generator (WG) hybrid power systems .They can generate electricity in order to serve a local energy demand, and it generally operates in areas that are far from the national

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