

Particle Swarm Optimization Backstepping Controller for a Grid-Connected PV/Wind Hybrid System.

Mohcene Bechouat, Moussa Sedraoui, Youcef Soufi, Laatra Yousfi, Abdelhalim Borni, Sami KAHLA

Abstract: The current paper investigates Backstepping controller using Particle Swarm Optimization for Photovoltaic "PV"/Wind hybrid system. The tested system was connected to the grid by three-phase inverter commissioned to address current depending on the grid parameters and still deliver its reactive power to zero. Backstepping control is a recursive methodology that uses Lyapunov function which can ensure the system stability. The best selection of Lyapunov function gains values should give a good result. In most of the literatures, the choice was based on the expertise of the studied system using hurwitzienne method considered as heuristic choice. The aim of this work is to propose an optimization using a powerful method commonly called Particle Swarm Optimization "PSO" able to calculate the gains values depending on the grid parameters by minimizing a selected criterion. The simulation results show that the PSO Backstepping controller gives good results shown in the current injected to grid with a small harmonic distortion despite climate change in the wind speed and the irradiation, which also shows the robustness of the applied control.

Keywords : PV/Wind Grid-Connected, MPPT, Backstepping Controller, PSO, Matlab/Simulink