International Journal of Photoenergy

Special Issue on

Monitoring, Diagnostics, and Power Forecasting for Photovoltaic Systems

CALL FOR PAPERS

The last decade experienced a really impressive growth of the worldwide installed photovoltaic (PV) capacity, exceeding 200 GW at the end of 2015. Although silicon based technology has largely proved its long-term reliability, the spread of the capacity over millions of solar fields, along with their inherent structure, pointed out the complexity of performing effective performance monitoring and accurate diagnostic of composing subsystems. The above issues are of enormous practical interest because the return of the investments done to build solar plants and perform high energy yields can be only achieved by guarantying optimal performance over a period approaching 20 years. Therefore, prompt detection, localization, and fixing of anomalous behaviors are crucial for avoiding revenue losses as well as possible irreversible damage of some key components of the PV system. Fault detection is still an open problem and a complicated task due to the fact that PV faults have highly nonindependent effects so that individual contribution to the overall performance is hardly distinguishable, even if power losses ascribable to single faulted solar panels can be much larger than the individual nominal power. Moreover, the power injected into the grid strongly depends on weather conditions, while the number of grid-connected systems today is well beyond the old "fit and forget approach" experienced until the end of the last century. Therefore, accurate models for the forecast of the power produced by solar systems are today very important.

Many monitoring/diagnostic methods have been proposed so far, spanning from real time electrical measurements to postprocessing of thermal images up to using artificial intelligence and data mining algorithms. However, almost all of them are at prototype level and are not ready to be adopted as standards by specialized bodies.

Much more research efforts are expected in the near future in efficient procedures for monitoring, automatic fault detection and diagnostic algorithms, specific modeling approaches, and weather and power forecasting techniques to ensure high long-term energy yields and reducing the return of investment period.

The aim of this special issue is to take stock of the current status of performance monitoring, health diagnostics, and yield forecasting for photovoltaic fields. Original research articles, as well as review articles, covering recent advances on the aforementioned fields are expected as contributions.

Potential topics include, but are not limited to:

- DC and AC side electrical monitoring
- Automated fault detection and diagnostic
- Modelling of PV systems for fault detection purpose
- Distribute sensors
- UAV assisted thermography
- Power line data transmission
- Analysis of thermal images
- Hot spot detection
- Artificial intelligence and data mining in fault detection and diagnostic
- Short-term weather and power forecasting

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