



Available online at www.sciencedirect.com

ScienceDirect

Energy Procedia 138 (2017) 301–306

Energy

Procedia

www.elsevier.com/locate/procedia

2017 International Conference on Alternative Energy in Developing Countries and Emerging Economies
2017 AEDCEE, 25 - 26 May 2017, Bangkok, Thailand

Fluctuation Characteristics effect analysis of Solar Irradiance Data by Wavelet transform

Nitikorn Silsirivanich

Faculty of Architecture and Design, Rajamangala University of Technology Ruttanakosin, Nakhon Pathom, Thailand

Abstract

Fluctuation of sun irradiance under multiple affected is important, and consider to the performance and reliability of the Photovoltaic (PV) power plant system. This research to propose the non-stationary characteristics detect technique by Wavelet transform, with MATLAB programming. From the experimental results, it is found. The Global irradiance component can be separated into Direct and Indirect components. The Indirect component upon scattered by passing clouds, nearby buildings, over-cast clouds etc., may have smaller or greater amplitude of are compared with Direct irradiation. An Indirect irradiation component in from time domain and frequency domain for consider to PV power plant location selection, capacity determination and power quality analysis

© 2017 The Authors. Published by Elsevier Ltd.

Peer-review under responsibility of the scientific committee of the 2017 International Conference on Alternative Energy in Developing Countries and Emerging Economies.

Keywords: Global irradiation; Fluctuation characteristic; Solar radiation; Wavelet transform

Corresponding author. Tel.: +0-662-441-6000; fax: +0-662-889-4588.
E-mail address: nitikorn.sil@rmutr.ac.th

1876-6102 © 2017 The Authors. Published by Elsevier Ltd.

Peer-review under responsibility of the scientific committee of the 2017 International Conference on Alternative Energy in Developing Countries and Emerging Economies.

10.1016/j.egypro.2017.10.098

1. Introduction

The impact of weather conditions, solar radiation has intermittence, randomness, uncertainty and other negative characteristics, which may cause power fluctuations of utility grid, and the voltage instability at the point of common coupling (PCC), as well as lead to serious power quality problem. The connection of large PV plants to the power grids must encounter several problems [1, 2]. The fluctuation of solar irradiance is one of the most important causing variations in PV power output. The variability can affect the power and supply quality leading to unfavorable operating conditions and stability in power system. The frequency fluctuations of irradiance produce by the multiple effects of cloud coverage of the sky [3-4]. Therefore, it is important to quantify the plausibility of irradiance effects more precisely and to understand irradiance fluctuation characteristics. In order to quantify the irradiance fluctuations, the tool for analysis would be allowed to simulate the amplitude and frequency of occurrence over time. With recent studies, the wavelet transform has been applied to the solar irradiance analysis [5].

The objective of the study is to illustrate the application of Wavelet Filter bank of Wavelet transform function in MATLAB. This technique fast transforms and effective tool, permitting the fluctuating irradiance signal extracted to a set of sub-signals obtaining an original irradiance signal and variance signal with less distortion and able to reconstruct the signal close to the original [6]. The proposed analysis of irradiance fluctuations by means of Wavelet transform can analyze all ranges of fluctuations at any time period and allows quantifying the effect contents of the fluctuating factors. Due to its time-frequency technique character, the approach allows a meaningful decomposition of the irradiance signal content which can predict the effects relevant to the PV power variability.

2. Theory

The Global radiation data is one of the most important indicators for PV power generation application. Faced with the non-linear, non-stationary characteristics of the observed solar radiation data [7], the detailed study is achieved in this investigation. In this paper, The Global irradiance can be separated into Direct and Indirect components by Wavelet transform and the detail of each section as following.

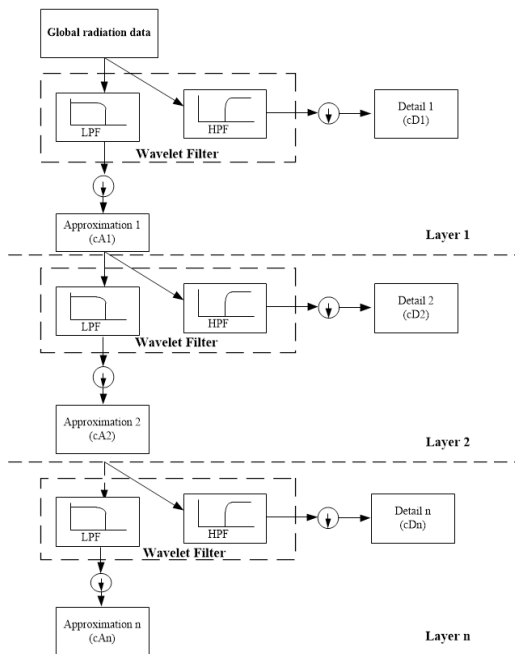


Fig. 1. The multi-layer decomposition using Wavelet transform

Download English Version:

<https://daneshyari.com/en/article/7917829>

Download Persian Version:

<https://daneshyari.com/article/7917829>

[Daneshyari.com](https://daneshyari.com)