

# Adaptation of Automatic Concentrated Pillar in Coastal Tropic Region

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## Abstract:

The paper presents a new technique for optimizing the solar irradiation utilization on a PV module. The technique somehow works partly on the principle of the concentrated solar power (CSP) tower. The design of the solar concentrator pillar was described to solve the challenges of solar shading and solar irradiation variability in coastal tropical region. Using meteorological dataset, a theoretical simulation that involves the optimization of the processes using Bessel, Legendre, Chebyshev and Lucas polynomial functions was adequately described. The analysis of the energy expected via the magnitude of solar irradiation was calculated. A maximum energy yield of 120kWhr can be obtained via theoretical analysis. The data is presented for further optimization processes.

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## I. Introduction

The establishment of a solar photovoltaic (PV) farm has gone far beyond energy budgeting and planning. The problem lies in the PV devices that are used. Hence, the interest in the PV farm is the adoption of new techniques to optimize energy conversion and storage. The upgrading of the PV systems is paramount, hence, the emergence of the concentrating solar power (CSP) technology. CSP system is made-up of -plant consists of three main subsystems such as: solar collectors that deal directly with the geographical solar irradiance; solar receiver that transmit the harvest irradiance; and a power conversion system that supplies energy to the end-users (1). A typical example of CSP device are parabolic trough, solar tower or central receiver, linear Fresnel and dish Stirling (2). The main consideration for setting-up the CSP is the available sunshine hour over the proposed farm. Hence, the tropics is considered to be more appropriate. However, in the tropical coastal region (which is characterized by high convective activity, sporadic nature of solar radiation and solar shading), it is observed that the sun shine hour is reduced due to

convective activities. Hence, the use of advanced control techniques have been applied to concentrating solar power systems to overcome the prevailing problems in tropical coastal region (3). Another scientist adopted the use of storage systems (4). Researchers have suggested the incorporation of the thermal energy storage (TES) system to the solar farm. This idea enables an efficient utilization of fluctuating solar energy on a continuous basis (5).

[Solar radiation prediction based on particle swarm optimization and evolutionary algorithm using recurrent neural networks](#)

2013 IEEE International Systems Conference (SysCon)

Published: 2013

[Forecasting power output for grid-connected photovoltaic power system without using solar radiation measurement](#)

The 2nd International Symposium on Power Electronics for Distributed Generation Systems

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