Modular Voltage Equalizer Topology with Reduced Number of Switch Count for Enhancing the Energy Yield During Partial Shading Conditions For PV System

Publisher: IEEE

Cite This PDF

Immad Shams ; Saad Mekhilef ; Kok Soon Tey All Authors

Abstract

Document Sections

I. Introduction

II. Operating Principle Of The Proposed Method

III. Simulation Results

IV. Experimental Results

V. Conclusion

Authors

Figures

References

Abstract: Partial Shading Condition (PSC) is one of the obstacles to the usage of PV devices, as with the activation of bypass diodes, the overall power extraction potential from P... **View more**

Metadata

Abstract:

Partial Shading Condition (PSC) is one of the obstacles to the usage of PV devices, as with the activation of bypass diodes, the overall power extraction potential from PV is significantly reduced. Various types of modular voltage equalizer (VE) topologies have been identified in the literature, but the key concern is the increase in the number of control switches and other components, with an increase in the number of series-connected PV modules. In this paper, modular VE topology has been proposed to equalize the voltages between solar modules during PSCs, based on the hybrid combination of inductor and capacitor as storage elements. The key advantages of the proposed approach are open-loop control with fixed duty cycle and frequency, as well as the design simplicity. The simulation results show that for complex shading patterns, the proposed method successfully shunned the multiple peaks and improved the capacity of power extraction from PV by 35.25% on

More Like This

Maximum Power Point Tracker (MPPT) for Photovoltaic Power Systems-A Systematic Literature Review

2018 European Control Conference (ECC)

Published: 2018

Evaluation of the “Hill Climbing” and the “Incremental Conductance” Maximum Power Point Trackers for Photovoltaic Power Systems

IEEE Transactions on Energy Conversion

Published: 2012

Show More

Keywords
Metrics
More Like This
Footnotes

average. The experimental results showed an improvement in efficiency by 30.575% on average.

Published in: 2021 IEEE 12th Energy Conversion Congress & Exposition - Asia (ECCE-Asia)

Date of Conference: 24-27 May 2021

Date Added to IEEE *Xplore*: 13 July 2021

INSPEC Accession Number: 20873842

DOI: 10.1109/ECCE-Asia49820.2021.9479009

ISBN Information:

Publisher: IEEE

ISSN Information:

Conference Location: Singapore, Singapore

Contents

I. Introduction

With the advent of cheap solar cells and the high number of researches in the area of building integrated photovoltaic systems (BIPV) and curved rooftop solar plug-in hybrid electric vehicles (PHEVs), the probability of partial shading conditions (PSCs) on PV panels for such systems is very high [1]. The power-voltage (P-V) curve will exhibit one particular maximum power point (MPP) under normal shading conditions, with the use of traditional converters such as buck, boost, buck-boost, etc. However, the bypass diodes are added in parallel across each solar module to prevent the hotspot phenomenon during PSCs, which not only dramatically decreases the overall power extraction potential of PV but also produces multiple peaks on the P-V curve [2], as shown in Fig. 1. Different types of circuit-based topologies have been presented in the literature to increase the energy yield during PSCs [3].

Authors
Figures
References
Keywords
Metrics
Footnotes

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

IEEE Account

- » Change Username/Password
- » Update Address

Purchase Details

- » Payment Options
- » Order History
- » View Purchased Documents

Profile Information

- » Communications Preferences
- » Profession and Education
- » Technical Interests

Need Help?

- » **US & Canada:** +1 800 678 4333
- » **Worldwide:** +1 732 981 0060
- » Contact & Support

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | Sitemap | Privacy & Opting Out of Cookies

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.