Abstract

This paper presents a circuit based simulation model for a solar photovoltaic (PV) module to examine the estimated electrical performance parameters with the changes of environmental parameter such as solar irradiation and temperature. Modeling and simulation of a solar PV module is presented based on Shockley diode equations. The Solarex MSX 120, a typical 120W PV module is chosen for model performance evaluation. The mathematical model for the chosen module is implemented on matlab with respect to various temperatures, solar irradiations, diode quality factors and model series resistances and obtained I-V and P-V characteristics curves were compared with the manufacturer’s published curves which show precise correspondence to the model.

References

1. Lopes, L. and A.-M. Lienhardt. A simplified nonlinear power source for simulating PV
2003: IEEE.
connected PV cell. in Power Electronics and Drive Systems, 2007. PEDS'07. 7th International
Conference on. 2007: IEEE.
in Green Energy and Technology (ICGET), 2015 3rd International Conference on. 2015: IEEE.
p. 1-5.
8. Femia, N., et al., Optimization of perturb and observe maximum power point tracking
in Energy Conference and Exhibition (EnergyCon), 2010 IEEE International. 2010: IEEE.
10. Solarex MSX120, 120W PV module datasheet.
http://www.solartaos.com/PDF/PV_Panels/solarexmsx120.pdf
11. Healy, S. and M. Green, Efficiency enhancements in crystalline silicon solar cells by
12. Wenham, S. and M. Green, Silicon solar cells. Progress in Photovoltaics: Research and
13. Zhao, J., et al., Twenty-four percent efficient silicon solar cells with double layer
3636-3638.
15. Gow, J. and C. Manning, Development of a photovoltaic array model for use in
16. AUTHOR’ PROFILE
17. Md. Abu Bakr Siddique received his B.Sc. in Electrical and Electronic Engineering (EEE)
from Islamic University of Technology (IUT), OIC, Bangladesh in November 12, 2014.
18. His main areas of research interest are Photovoltaic (PV), Solar Cell, Renewable
energy, Green energy, Power system stability and control, electrical machine, energy storage
system (ESS), biomedical engineering, nanotechnology and Control system.
19. At present, Md. Siddique is working as a full time Lecturer at IUBAT – International
University of Business Agriculture and Technology in EEE Department since January 13, 2015.
He has teaching experiences on Power System Analysis (EEN 453), Power System Analysis
Lab (EEN 454), Microprocessor Systems and Interfacing (EEN 373), Microprocessor Systems
and Interfacing Lab (EEN 374), Feedback System Analysis and Design (EEN 407), Feedback
System Analysis and Design Lab (EEN 408) at IUBAT.
20. S. M. Rezaul Karim is working as a Lecturer of Electrical and Electronics Engineering (EEE) Department of IUBAT - International University of Business Agriculture and Technology, Dhaka, Bangladesh. Before joining in IUBAT, Mr. Karim completed his M.Sc. in IT from Institute of Information Technology, University of Dhaka (DU).

21. Shariful Islam Sharif is a student of Electrical and Electronics Engineering (EEE) Department of IUBAT - International University of Business Agriculture and Technology, Dhaka, Bangladesh. The areas of his research interest are smart grid, fiber optics transmission, renewable energy etc.

22. M. Tanvirul Hoque is currently working as a Lecturer at International Islamic University Chittagong (IIUC), in the department of Electrical and Electronic Engineering (EEE). He received his B.Sc. in Electrical and Electronic Engineering (EEE) from Islamic University of Technology (IUT), OIC, Bangladesh in November 12, 2014.

23. His main areas of research interest are Photovoltaic (PV), Solar Cell, Renewable energy, Energy management, Sustainable energy system energy storage system (ESS) etc.

**Index Terms**

Computer Science  
Circuits and Systems

**Keywords**