ANALYSIS, PERFORMANANCE & STUDY OF SOLAR PHOTOVOLTAIC NON CONVENTIONAL ENERGY SYSTEM

DR.RAVINDRA M.DESHMUKH
HOD
DRGIT&R AMT.

PROF.SHREYAS RAJENDRA HOLE, PROF.SHAILESH NICHAT, PROF.SNEHAL A GOMASE, PROF. SHIVANI G. DHARMALE,
ASSISTANT PROFESSORS
DRGIT&R AMRAVATI.

ABSTRACT: India has a relatively long sunny day for more than ten month and partly cloudy sky for rest two month. Many projects has been done on using photovoltaic cells in collecting solar radiation and converting it into electrical energy but most of the projects did not take into accounts the difference of the sun angle of incidence by installing the panels in the fixed orientation which influences very highly.All over the world, the growth in electric power demand has slowed down and dropped to 0.7% per year [1]. Capacity addition to the grid has kept up with the demand, but the sources of generation have varied over decades. This has given renewable energy sources a tremendous growth potential, and recent capacity additions have come mainly from natural gas and renewable. Among renewable, solar and wind power provide most of the growth [1]. The steady and rapid growth in solar photovoltaic installation across the world has been driven by many factors including renewable portfolio standards, decreasing costs of installations and incentives such as feed-in-tariffs or net-metering mandated by governments [1]–[3]. The increasing capacity addition of solar PV and installation of larger power stations has led to research and development in high-power converter topologies for PV applications.

INTRODUCTION

Solar power energy is the raw material and main and important source for several applications of renewable energy systems or non conventional energy system thus, knowledge about the intensity of solar irradiation is essential for efficiency of these systems. Electric energy and thermal energy sources capable of meeting the growing demands of society with minimal impacts to the environment and high efficiency have been object of research in the last decade. In this context, the conversion of sunlight into electricity through photovoltaic cells has become one of the most encouraged and used resources in the world. However, the most unpredictable factor, which hampers capturing solar irradiation, preventing a proper conversion of sunlight into electricity, is the presence of clouds in the sky.

LITURATURE REVIEW

Nicolae-Cristian et. al. [5] introduces a reliability-oriented design tool for a new generation of grid-connected photovoltaic (PV) inverters. The proposed design tool consists of a real field mission profile (RFMP) model (for two operating regions: USA and Denmark), a PV panel model, a grid-

connected PV inverter model, an electrothermal model, and the lifetime model of the power semiconductor devices. An accurate long-term simulation model able to consider the one-year RFMP (solar irradiance and ambient temperature) is developed. Thus, the one-year estimation of the converter device thermal loading distribution is achieved and is further used as an input to the lifetime model. The proposed reliability-oriented design tool is used to study the impact of mission profile (MP) variation and device degradation (aging) in the PV inverter lifetime. The obtained results indicate that the MP of the field where the PV inverter is operating has an important impact (up to 70%) on the converter lifetime expectation, and it should be considered in the design stage to better optimize the converter design margin. In order to have correct lifetime estimation, it is crucial to consider also the device degradation feedback (in the simulation model), which has an impact of 20–30% on the precision of the lifetime estimation for the studied case.

Somasundaram Essakiappan et. al. [4] discussed megawatt-scale PV plant is divided into many zones, each comprising of two series-connected arrays. Each zone employs a medium-frequency transformer with three secondary's, which interface with the three phases of the medium voltage grid. An insulated-gate bipolar transistor full bridge inverter feeds the MF transformer. The voltages at the transformer secondary's are then converted to three-phase line frequency ac by three full-bridge ac–ac converters. Second line frequency harmonic power does not appear in the dc bus, thereby reducing the dc capacitor size. Cascading several such cells, a high-quality multilevel medium-voltage output is generated. A new control method is proposed for the cascaded multilevel converter during partial shading while minimizing the switch ratings. The proposed topology eliminates the need for line frequency transformer isolation and reduces the dc bus capacitor size, while improving the power factor and energy yield. Paper presents the analysis, design example, and operation of a 10-MW utility PV system with experimental results on a scaled-down laboratory prototype.

Mr.K.Natarajan1 et. al. [7] presents the design of a Single Ended Primary Inductor Converter (SEPIC) for solar PV system. SEPIC acts like a buck-boost DC-DC converter and it allows a range of DC voltage adjust to maintain a constant output voltage. Maximum Power Point Tracking (MPPT) technique should be used to track the maximum power point continuously which depends on panel's irradiance conditions in PV solar system. The Maximum power point has been achieved by adjusting the switching frequency of the converter. The efficiency of the converter is improved by the coupled inductor because it needs only lesser amount of magnetic core. The SEPIC converter and their various control strategies has been discussed and simulated using Simulink/MATLAB software.

Abhijit V. Padgavhankar [6] solar photovoltaic system convergence time is reduced using maximum power point tracking algorithm which responds faster to the atmospheric changes over a conventional algorithm with minimum ripple content in the output. Digital controller is used to control the dc-dc boost power converter and dc-ac inverter using efficient soft switching pulses. Voltage sensor is used to vary width of the pulse to maintain the boost converter output constant level. Using current sensor frequency of the generated pulse is varied so ripple contents of the output are reduced to improve the power quality. MOSFET single phase H-bridge inverter is used to convert constant solar power into ac signal with the minimum ripple in the output and power losses. Efficient sinusoidal pulse width modulation technique is used to reduce the switching losses with the help of digital controller. For the proposed system validation Proteus 8 simulation and implemented hardware results are presented. The system has minimum switching losses, faster convergence time and high power quality.

Conclusion: Today is a Non Conventional energy era . So we need to study related to renewable energy .there are seven different types of renewable energy all of them solar Power Energy is one of the most familiar energy to all . solar power energy is very easy to install and maintenance. To maintain maximum power by solar module we need to get MPP by using MPPT DC to DC converter.

REFERENCES

[1] U.S. Energy Information Administration, “Annual energy outlook 2013” May 2, 2013.

[2] D. J. Hurlbut, J. McLaren, and R. Gelman, Beyond Renewable Portfolio Standards, Nat. Renewable Energy Lab., Golden, CO, USA, Aug. 2013.

[3] Greentech Media Inc. Research, and Solar Energy Industries Association, “U.S. Solar Market Insight Q1 2013,” 2013.

[4] Somasundaram Essakiappan, Harish S. Krishnamoorthy, Prasad Enjeti, Robert S. Balog, Shehab Ahmed, "Multilevel Medium-Frequency Link Inverter for Utility Scale Photovoltaic Integration", IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 30, NO. 7, JULY 2015.

[5] Nicolae-Cristian Sintamarean,Frede Blaabjerg, Huai Wang,Francesco Iannuzzo, Peter de Place Rimmen, "Reliability Oriented Design Tool For the New Generation of Grid Connected PV-Inverters", IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 30, NO. 5, MAY 2015.

[6] Abhijit V. Padgavhankar, Sharad W. Mohod, "Analysis And Performance Improvement Of Solar Photovoltaic System Using Digitally Controlled Power Converters", Satellite Conference ICSTSD 2016 International Conference on Science and Technology for Sustainable Development, Kuala Lumpur, MALAYSIA, May 24-26, 2016.

[7] Mr.K.Natarajan1, M.Supriya2, Y.Abinaya3, P.Nandhakumar4, G.R.Samrajesh, "DESIGN OF A SEPIC CONVERTER FOR SOLAR PV SYSTEM", International Conference on Scientific Research of Engineering and Technology, At Coimbatore, March 2017.