CHAPTER-6

CONCLUSION & FURTHER SCOPE FOR STUDY

Discussion

The importance of photovoltaic system is increasing day by day, as the cost of the solar cells decreases. After fabrication of the solar panel, it is imperative to process the PV power for its optimum utilization. For the processing of PV power, electronic circuits are needed. In our country very little progress has been made in this direction.

The main objective of the present work has been to design and construct an efficient power point tracker circuit for optimum utilization of power of PV system to load.

The maximum power point tracker circuits designed and built in the present work have been thoroughly described. It may be noted that the whole circuits worked in the switching mode and the amount of power dissipation was considerably small.

This MPPT is suitable for resistive loads, dc motor, battery charging and florescent lamps drive. They are step down MPPTs. The load to be used with this MPPT has such magnitudes, whose load line intersects the I-V curve of the PV array, the point lower than the maximum power point (MPP). If load of higher magnitude is used, then a step up maximum power point tracker would be needed.

The main aim of MPPT circuit was to observe whether the circuit could track MPP as accurately as possible. It was found that the traditional method of sensing power from the sensor circuit worked quite well. It can be mentioned that the use of a MOS transistor in place of 2N3055 transistor would enable to us to have higher frequency of operation and thereby saving certain amount of power in the inductor.

The designed and fabricated circuit described previously has the limitation that, as one maximum power point tracking cycle is the accomplished, PV panel continuous to operate at this MPP for that particular instant. But if the insulation has changed, the PV panel remains to be operating at its previous position. To circumvent this difficulty there are two different circuits can be employed. One solution is to place a transistor switch across linear ramp capacitor C (100 μF), and switching the transistor ON and OFF frequently employing a stable multi vibrator, so that in every ON-OFF period a new tracking cycle begins.

In case of simulation of the system performance, two weather conditions are taken into account- sunny and cloudy. From comparative analysis it is seen that during sunny day the system's performance is better. The main fact is PV output power is higher in sunny weather condition.

Load leveling i.e. to level the power taken from grid line plays an important role in performance study. It is seen from the simulation output that during cloudy day, because of lesser PV output, load leveling cannot be done in a satisfactory way. The grid power is used in an irregular way as the PV system is not enough to fulfill the load requirement. In contrast to this in sunny day PV system shows a better performance with approximately flat i.e. better load leveling. The performance of the PV system for two different weather conditions can be summarized by savings of the system. In sunny day the saving is 43% whereas in cloudy day the savings is 5.62%.

Conclusion

It is obvious that the known resources of fossil fuels in the world are depleting very fast and by the turn of the century, man will have to increasingly depend upon renewable resources of energy. Apart from this free availability in nature of such forms of energy, they are also pollution free and lend themselves to use in a decentralized manner, reducing the cost transmission and distribution of power.

Sun is a primary source of energy, and all forms energy on the earth is derived from it.

The solar energy can be harnessed either by deriving energy directly from sunlight or by indirect methods. Directly the solar energy can by obtained by:

- Solar thermal technology, i.e. harnessing of solar heat into useful energy using collectors.
- Photovoltaic energy conversion technology. This is the most useful way of harnessing solar energy by directly converting it into electricity by means of solar photovoltaic cells. When sunshine is incident on solar cells, they generate D.C. electricity without the Involvement of any mechanical generators. The electrical energy output from solar PV cells depends upon the intensity of sunlight incident on it, its conversion efficiency and temperature of operation. It is a highly versatile approach, since the generated electrical power can be used conveniently for various diverse purposes at the site of use. The third source is through :
- Solar hydrogen gas production technology. It is still at an embryonic stage.

The indirect method is in the form of wind, biomass and biogas and through tides.

Future Recommendations

Day by day solar energy technology is becoming the best choice as it is approximately maintenance free, long lasting and environment friendly.

- In this work in case of PV output estimation only two weather conditions-sunny and cloudy are compared. It can also be done with more different weather conditions such as rainy, foggy, hazy, dusty etc.
- The measured simulated data can be compared with practical simulated data for almost entire areas of a country so that the performance of PV system can be understood in details. It will help to implement the system in an effective way.
- Comparatively cheap price of neon solar cell makes the system more applicable in developing countries. But it would be more beneficial if the rate electricity price is different at peak hour and OFF peak hour. Then using the suggested PV system optimal economic mode can be achieved. In addition using net metering, the system will be more cost effective.

List of Abbreviations

PV array= Photovoltaic array.

BOS= Balance of System.

AC =Alternating Current.

DC=Direct Current.

PCU= Power Conditioning unit.

MPP= Maximum Power Point.

MPPT= Maximum Power Point Tracker.

ARC=Anti Reflecting Coating

The END

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