Controller Design for Non-linearity in PV: A Review

Ajay Singh[1*], Sneh Rachna[2], Rajesh Kumar[3], Anil Kumar[4]

[1]Department of Electrical Engineering, GITAM, Jhajjhar, Haryana, India
[2]Department of Electronics and Communication, CIT, Bengaluru, Karnataka, India
[3]Department of Electrical Engineering, MITRC, Alwar, Rajasthan, India
[4]Department of Mechanical Engineering, J. P. Group of Institution, Mohalganj, Lucknow, India

[*]Corresponding Author

A B S T R A C T

With the advent of the technological advancement, it is inevitable that there is a surge in energy demand. This energy demand is fulfilled mainly by conventional energy sources. Because of this there is significant increase in pollution and will cause the problem of resource extraction. Hence the need to shift towards renewable energy sources is inevitable. Among these renewable sources, solar/PV is considered over here. The solar is posed with the issue of varying irradiance. This irradiance causes non-linearity in the system. In order to address the problem of non-linearity, boost converter design is reviewed along with various controllers. In order to analyze the system first it is understood that how solar/PV works on the basis of equations. Then after considering the issues of non-linearity, a solution of controlled and increased output is then considered. The basic boost converter is mathematically modelled using state space analysis. Now in order to eradicate the issues caused due to non-linearity, state space averaging technique is being used by the authors. For further analyzing controller design is made and hence they are compared. After comparison Type-3 compensator is then considered best for solving non linearity issues. Hence the paper carries out careful analysis of PV system, associated non-linearity's, methods to eliminate non-linearity's via state space analysis and respective controller design. With the help of this work the authors are carrying out further studies with the aid of the MATLAB to elucidate the findings of this literature review. This would be done using the equation and modelling them using SIMULINK and their respective graphs will be plotted and compared.

Keywords: Energy, Demand, Renewable, Non-Linearity, Converter, Controller