

POWER QUALITY IMPROVEMENT USING IPFC IN A PV CONNECTED SYSTEM

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Abstract— Power quality is most essential angle in control framework condition. Amid sustainable power sources interconnection to lattice numerous power quality issues happens. Most habitually happening unsettling influences, influencing the nature of energy are voltage hangs and swells. The Interline Power Flow Controller gives an actually progressed and temperate answer for voltage droop and swells issues. The undertaking gives a sustainable power source i.e., a sun based exhibit which is bolstered to disseminate frameworks and associated with lattice. MATLAB SIMULINK comes about acquired are exhibited to demonstrate the viability of the proposed framework to enhance control quality.

Keywords—IPFC, Sag, Swell, Power Quality, PV cell.

I. INTRODUCTION

Power quality is an arrangement of electrical limits that enables a bit of gear to work in its proposed way without noteworthy loss of execution or future. Every single electrical gadget is inclined to disappointment when presented to at least one power quality issues. The electrical equipment may be an electric engine, a transformer, a generator, a PC, a printer, correspondence gear, or a family unit apparatus. These gadgets and others respond antagonistically to control quality issues relying upon the seriousness of issues. Power is just the stream of vitality and the current requested by a heap is to a great extent wild. "Power quality" is an advantageous term for some; it is the nature of the voltage, instead of energy or electric current. The term is utilized to depict electric power that drives an electrical load and the heap's capacity to work appropriately. The execution of electronic gadgets is straightforwardly connected to the power quality level in an office. The electric power industry includes power age (air conditioning power), electric power transmission and eventually power circulation to a power meter situated at the premises of the end client of the electric power. The power at that point travels through the wiring arrangement of the end client until

the point when it achieves the heap. The intricacy of the framework to move electric vitality from the purpose of creation to the point of utilization joined with varieties in climate, age, request and different components give numerous chances to the nature of supply to be bargained. Power quality is most imperative angle in control framework condition. Amid sustainable power sources interconnection to matrix, numerous power quality issues happens. Most as often as possible happening aggravations, influencing the nature of energy are voltage droops and swells. Power quality issues in the present day dispersion frameworks are homeless people, droops, swells and different mutilations to the sinusoidal wave type of the supply voltage influence the execution of the hardware.

The Interline Power Stream Controller is utilized to give an in fact progressed and practical answer for voltage-list issue. To control the power quality issues, for example, sag, swell Photo Voltaic Cell based IPFC is utilized.

II. INTERFACING RENEWABLE ENERGY SOURCE TO IPFC USING SRF CONTROL TECHNIQUE

A. . Photovoltaic (PV) Systems:

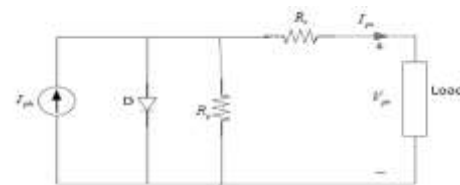


Fig 1. Single diode model of PV Cell.

$$I_{pv} = I_{ph}N_p - I_sN_p \left[\exp \left(\frac{q \left(V_{pv} + I_{pv}R_s \frac{N_s}{N_p} \right)}{aV_tN_s} \right) - 1 \right] - \left(\frac{q \left(V_{pv} + I_{pv}R_s \frac{N_s}{N_p} \right)}{R_p \frac{N_s}{N_p}} \right)$$

Where

I_0 is the diode’s reverse saturation current

V_T is the diode’s thermal voltage

a is the ideality factor of the diode

issue on the framework level, essentially voltage variances and conceivable consonant infusion, is frail and it can be relieved by infusing a controlled-responsive power through the PV inverter itself or by means of adjacent controlled receptive power sources. In this way, the dominant part of PV contemplates are coordinated either towards the inner controls of the PV age framework for better vitality preparing and exact power following or towards the advancement of more intriguing sunlight based cell innovation for more noteworthy effectiveness and to bring down the general age cost. It is worth to say that substantial breeze and PV ranches are ordinarily associated at the sub-transmission or transmission levels, where the framework firmness is higher and the effects are less articulated. Subsequently, examines identified with these ranches with regards to appropriation frameworks are not pragmatic and will prompt awed outcomes. A PV generator is interfaced to the brace or load by means of a power electronic converter; as a rule a voltage source inverter.

B. INTERLINE POWERFLOW CONTROLLER (IPFC):

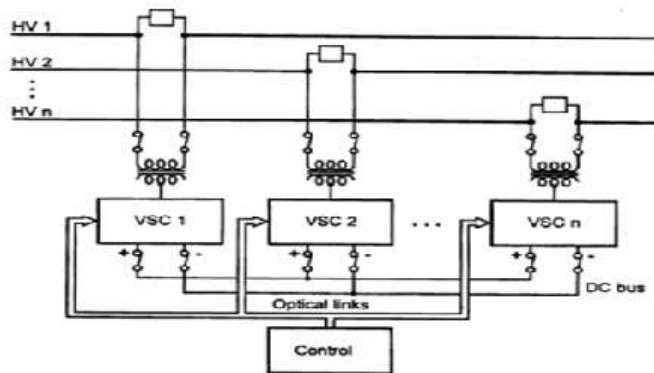


Fig 2.Schematic Diagram of IPFC

Power quality issues in the present day appropriation frameworks because of the expanded utilization of touchy and basic hardware pieces, for example, correspondence

organize, process businesses and exact assembling forms. Power quality issues, for example, homeless people, hangs, swells, and different twists to the sinusoidal waveform of the supply voltage influence the execution of these gear pieces. Innovations, for example, custom power gadgets are developed to give insurance against control quality issues. The Interline Power Stream Controller (IPFC) is one of the most recent age and progressed adaptable air conditioning transmission frameworks controller which can be utilized for dynamic pay and compelling force stream administration among transmission passageways. It is VSC-based Realities controller for arrangement remuneration with the special capacity of energy administration among multiline of a substation. It at the same time controls the power stream in multiline frameworks or sub organizes. Since IPFC contain converters with regular direct current connection, any inverter inside the IPFC can exchange genuine energy to another and there by encourage genuine power exchange among the lines of the transmission framework. IPFC might be utilized to comprehend the mind boggling transmission arrange packing administration issues that transmission organizations are presently a day looking to transmit an extensive power. Straightforwardness and quick framework reaction are two principle attributes of Interline control stream controller. From numerous Reality gadgets today, IPFC is further developed and simple controller to explain the congestion of the power administration of the transmission framework. However some structure of interline control controller (IPFC) is comprises of an arrangement of converters that are associated in arrangement with various transmission lines without shunt convertor.

As said above, IPFC comprises an arrangement of converters. The converters are associated through a typical DC connect to trade dynamic power. Every arrangement converter can supply free receptive remuneration of possess transmission line. In the event that a shunt converter is engaged with the framework, the arrangement converters can likewise give autonomous dynamic remuneration; generally not all the arrangement converters can give free dynamic pay to their own particular line.

IPFC is a blend of partitioned arrangement controllers, which are controlled in an organized way, in a multiline transmission framework. In which arrangement Controllers give autonomous arrangement responsive pay to each line yet additionally exchange genuine power among the lines by means of the power connect. The genuine power exchange capacity of the brought together arrangement Controller, alluded to as Interline Power Stream Controller, makes it conceivable to adjust both the genuine and receptive power stream in the lines and in this manner expand the usage of the transmission framework. Note that the expression "bound together" here implies that the de terminals of all Controller converters are altogether associated together for genuine power exchange.

The plan of at least two Static Synchronous Arrangement Compensators which are coupled by means of a typical dc

IV. RESULTS:

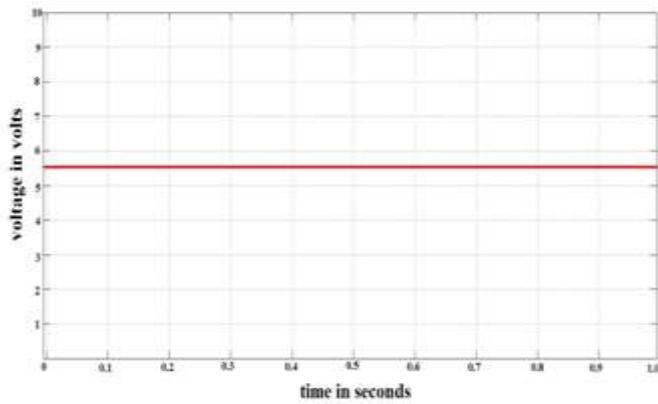


Fig 7.PV Cell Model Output Voltage

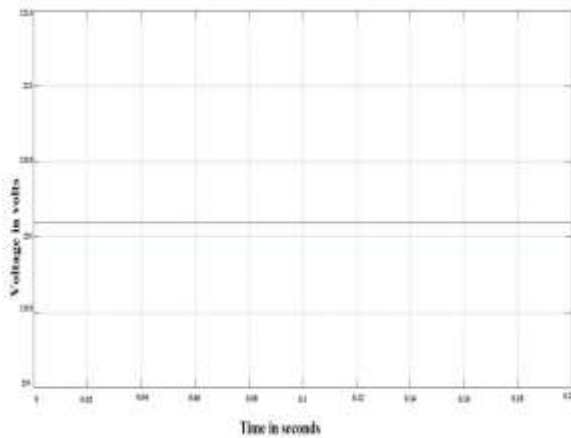


Fig 8.PV Array Output Voltage

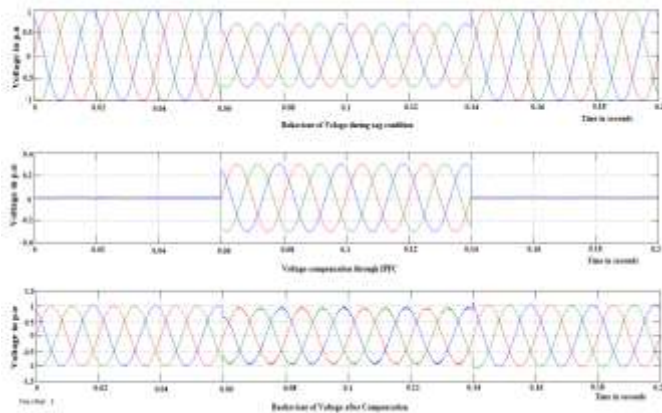


Fig 9. Compensation during sag condition

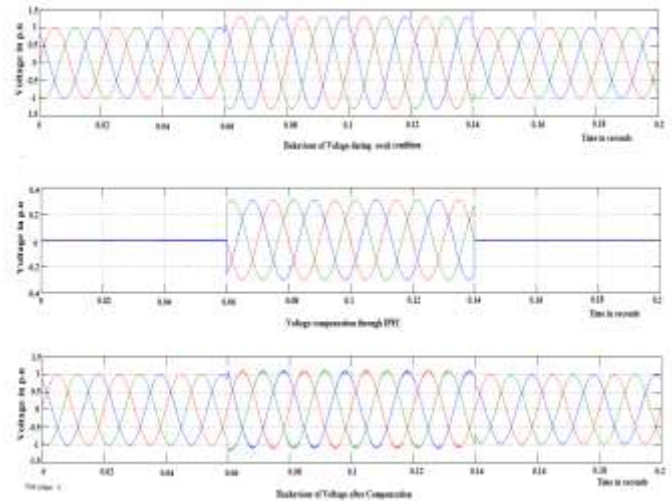


Fig 10.Compensation during swell condition

V. CONCLUSION

This project presents the design of Distribution Generation and the operation of Distribution Generation during grid connected has been presented with the help of MATLAB/SIMULINK. The proposed system with synchronous frame controller in a control design; the control design performance through is observed during sag and swell outage condition. The control design consists of d-q transformation which gives the switching pulses to the inverter. This project also deals with the FACTS controller Interline Power Flow Controller (IPFC). The system is tested under different test cases and a validate results are presented in this paper.

VI. FUTURE SCOPE

Here the d-q hypothesis based framework associated PV was utilized as circulated age frameworks utilizing IPFC as custom power gadget and it was produced by utilizing MATLAB reproduction. In future for different custom power gadgets and Circulated Age Frameworks the control method execution can be watched. The blame discovery rationale can be tried for different kinds of issues.

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