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INDUCTION MOTOR POWER QUALITY ISSUES ANALYSIS USING MATLAB

[1]Pallavi Vishnu Bhoye , [2]Yadnesh Dharmraj Jagtap, [3]Kunal Sunil Kordka, [4]Deep Balkrishn Tungare [5]Rahul Sanjay Bankar

[1]UG Scholar, Dept. of Electrical Engineering , Sanghavi College of Engineering Nashik.
[2]UG Scholar, Dept. of Electrical Engineering , Sanghavi College of Engineering Nashik.
[3]UG Scholar, Dept. of Electrical Engineering , Sanghavi College of Engineering Nashik.
[4]UG Scholar, Dept. of Electrical Engineering , Sanghavi College of Engineering Nashik.
[5]Asst.,Prof., Dept. of Electrical Engineering , Sanghavi College of Engineering Nashik.

ABSTRACT - This paper in existence a complete system connected to all situations power quality event, which has been achieved using MATLAB/SIMULINK and utilizing parametric equations. In electrical energy allocation system, power quality disruptions have become a significant issue for customers and usefulne ss.This system uses transformer energising, two capacitor banks for distribution, line fault, induction motor start ing, nonlinear load, and transformer initiation to simulate various types of voltage sag.In the general model, the effect of capacitor bank switching produces a temporary voltage through a distribution network simulation.This model is enhanced for clarity with an integrated block and setting where all event scenarios are arranged for ene rgy quality without diluting the essence of it.It is too advantageous to simulate various energy quality waveform s using this integrated model.The effectiveness of the recently acquired automatic classification algorithms is su itable for examining power waveforms. quality.

I. INTRODUCTION

An integral component of developing an energy system is power quality, or PQ.Ensuring the integrity of the ene rgy being delivered by the industry client is of utmost importance.A fault may occur during distribution or trans mission.A severe PQ event, such as voltage sag brought on by a problem in the gearbox or distribution degree, may cause hundreds to thousands of financial casualties in the affected industry.The AC power supply unit is int ended to operate at a regular frequency and sinusoidal voltage (usually 50 or 60 Hz).Power quality events includ e flicker, harmonic, transient, voltage notch, voltage swell, and voltage sag.Research on power quality is the stu dy of several phenomena that lead to control quality events and the enhancement of extenuation quality disturbances are establishing each time there is a sizeable alternate in the supply voltage importance, supply frequency, and/or waveform deviation because of numerous varieties of faults, nonlinear loads, switching of heavy hundreds, strength electronics converters etc. The non-stop energy systems enlargement and load of varying nature have imposed high requirements in defensive equipment's, especially related with pace and accuracy. These are crucial factors for fault clearance. If a fault isn't nicely detected and eliminated, vast harm or an electricity gadget blackout can also take location. The behavior of defensive devices may trade with the diverse styles of loads including linear and non-linear hundreds related with the distribution gadget . Simulation method is one of the widely used studies approach to version and simulate diverse energy first-rate

events. Simulation method offers an intuition from how the PQ exceptional occasion behaves via converting the simulation parameters and is beneficial for demonstrate proposal. Simulation is likewise usually accustomed for simulate energy satisfactory proceedings waveform to appraisal of energy anatomy algorithm. There is numerous energy device simulation gear to be had and every simulation equipment has it very own deserve .

II. TYPES DISTURBANCES OF POWER QUALITY

Voltage Sag :

The voltage sag can be known is the to the highest degree common kind of power quality disturbances that is typically lasting from 0.5 to 10 round inside the users' premises. It's commonly related with faults in the short circuit which includes line to line (LL), line to ground (LG), three phase to ground (LLLG) and double-line to ground (LLG) faults [19-20].

Voltage Swell :

It is too related within the short track faults at energy system. The sag could be produced at the section wherein fault is happened whilst the swell is created at non-fault levels, In a (LG) fault. It's can be establishing via change-off an energizing a big capacitor bank or heavy load [19-20].

Interruption :

The interruption is known the entire mislay to the supply voltage for a time frame no longer exceeding 1 minute. The supply of voltage could be reduced to 10% to the formal worth. The energy device faults, manage features are the consequences of the interruption and system failure [19-20].

Harmonics :

It's currents owning frequencies or sinusoidal voltages which can be integer increases to the basic frequency (50 or 60Hz). It is specially as a result of the nonlinear loads inclusive of inverters and rectifiers and different static energy conversion system [19-20].

Transients :

The transient is known an unwanted and brief occurrence in strength device. It's can be categorized as impulsive and oscillatory. The transient manufactured owing into switching on/off of capacitor financial institution energization, oscillatory temporary and heavy load. The temporary normally as a result of the lightning strokes is called impulsive temporary [19-20].

Voltage Flickers :

The flickers are structured differences from the deliver voltage surround or a chain from casual voltage difference, the significance of which does now not be over via 0.9 to1.1 pu. The voltage perversions result by the non-stop and quick accounts inside the load are described as fluctuations. It is an electromagnetic occurrence whilst fluctuation is an unpleasant consequence to the voltage inconstancy in some load. each terms have equal that means in standards [19-20].

Power Frequency Variations :

It is known the perversion inside the essential frequency of its unique titular amount (60 or 50 Hz). There's moderate version at frequency owing as mismatch inter generation and load.

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III. HARDWARE IMPLEMENTATION

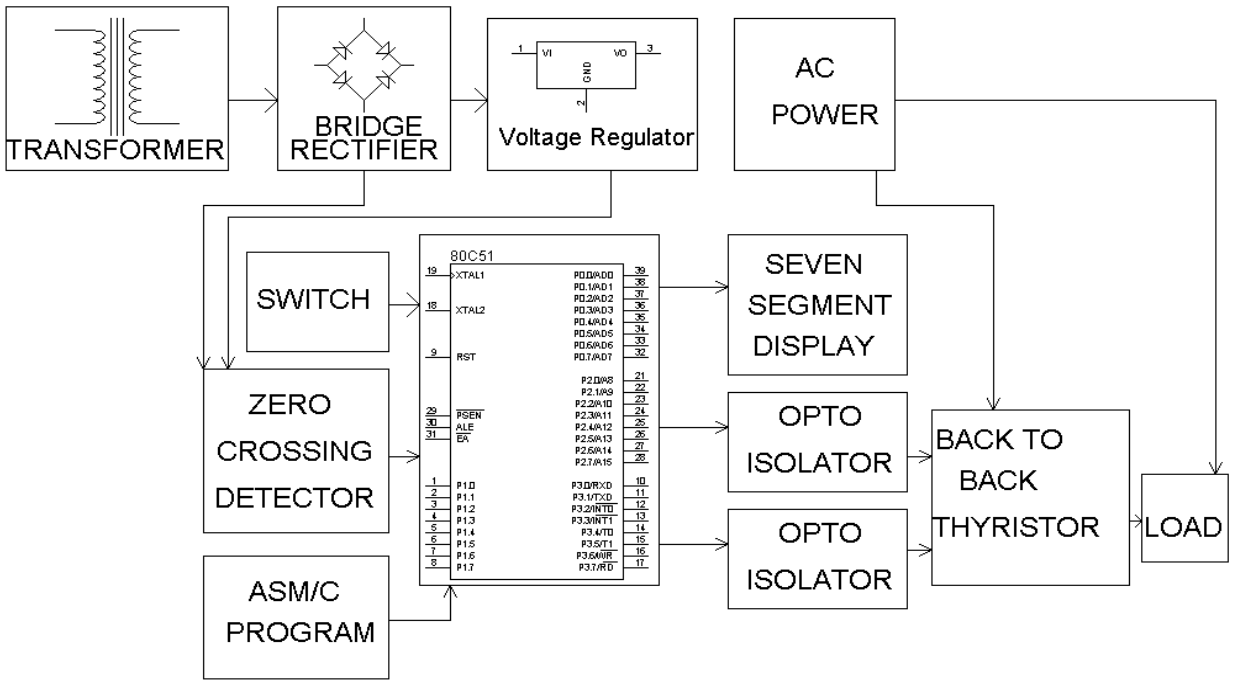

Fig.1 -Hardware Implementation

In this above block diagram we can able to see many components used such as ……

1_ Transformers: Transformers convert AC electricity from one voltage to another with a little loss of power. Step-up transformers increase voltage, step-down transformers reduce voltage.

2_Voltage regulator: Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

3_Rectifiers: A rectifier is an electrical device that (AC), which periodically reverses direction, to (DC), current that flows in only one direction, a process known as rectification. Rectifiers have many uses including as components and signals.

4_The LM393 series consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0mV max. for two comparators which were designed specifically to operate from a single power supply over a wide range of voltages.

5_ Thyristor: A thyristor is a **four-layer device** with alternating P-type and N-type semiconductors (P-N-P-N). In its most basic form, a thyristor has three terminals: anode (positive terminal), cathode (negative terminal), and gate (control terminal). The gate controls the flow of current between the anode and cathode.

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IV. SIMULINK MODEL

Simulink model usually incorporate distribution nonlinear load, capacitor bank switching, transformer energizing, induction motor starting and line fault string-theory are represented in the pursuing parts to simulate energy quality occurrence. The stage of distribution voltage used inside the pattern is founded on Iraq pattern code.

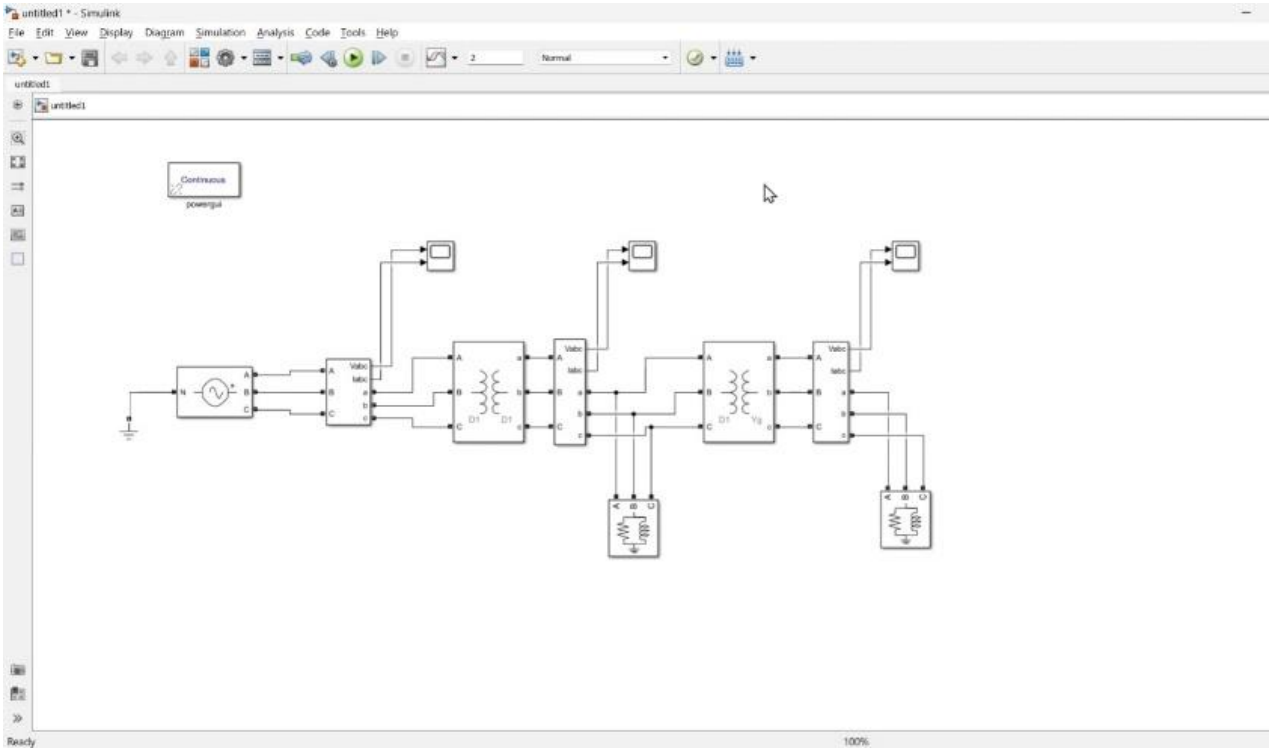

Fig. 2 - Simulink Model

I. RESULT

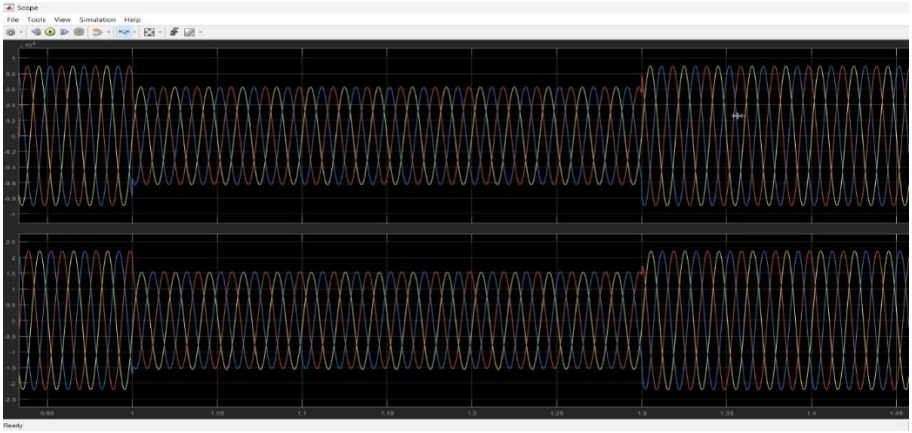

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Fig. 3 -Result

I. CONCLUSIONS

This work provides two methods for simulating the event distribution of power quality level, including voltage swell, voltage sag, harmonic, voltage notch, and transient, using Simulink models and simulation (mathematical models).This integrated Simulink mode is available as a necessary version for building more elaborate simulations of power quality events.This model is too useful for simulating a wide range of energy waveforms for private power quality analysis algorithms.

REFERENCES

[1] Mohd Izhwan Muhamad, Norman Mariun, Mohd Amran Mohd Radzi, "The Effects of Power Quality to The Industries", IEEE 5th Student Conference on Research and Development, SCOReD., 2007.

[2] D Danalakshmi, Srinivas Bugata, Kohila J, "A control strategy on power quality improvement in consumer side using custom power device", Indonesian Journal of Electrical Engineering and Computer Science (IJEECS),
Vol. 15, No. 1, July 2019, pp. 80-87

[3] Pankaj Gakhar," A Novel Control Strategy for Power Quality Improvement in Grid-Connected Solar Photovoltaic System," Indonesian Journal of Electrical Engineering and Computer Science (IJEECS), Vol 15, No 3: September 2019.

[4] Khokhar, S., Zin, A., Mokhtar, A. and Ismail, N. (2014). "MATLAB/Simulink based modeling and simulation of power quality disturbances". 2014 IEEE Conference on Energy Conversion (CENCON).

[5] Alex McEachern, "A Free Simulator Program for Teaching Power Quality Concepts", 9th International Conference Electrical Power Quality and Utilisation, Oct 2007.

[6] D Danalakshmi, Srinivas Bugata, Kohila J," A control strategy on power quality improvement in consumer side using custom power device," Indonesian Journal of Electrical Engineering and Computer Science (IJEECS), Vol. 15, No. 1, July 2019, pp. 80-87.

[7] Lokendra Bam, Ward Jewell, "Review: Power System Analysis Software Tools", IEEE PES General Meeting, Vol. 1, pp. 139-144, Jun 2005.

[8]Miklos Danyek, Peter Handl, David Raisz, "Comparison of Simulation Tools ATP-EMTP and MATLAB-Simulink for Time Domain Power System Transient Studies".

[9] Nita R.Patne, Krishnarao L.Thakre, "Stochastic Estimation of voltage Sag Due to Faults in the Power System by Using PSCAD/EMTDC Software as a Tool for Simulation", Journal of Electrical Power Quality and Utilisation, Vol. 13, No. 2, pp. 59-63, 2007.

[10] Jose Maria Carvalho Filho, Roberto Chouhy Leborgne, Jose Policarpo G. de Abreu, Eder G.C. Novaes, Math H.J.