POWER QUALITY IMPROVEMENT BY ACTIVE SHUNT FILTER WITH HYSTRESIS CURRENT CONTROLLER

Mr.A.Sydaiah[1], B. Venkatesh[2], T. Akshaya[3], A. Madhu[4], N. Bharath Simha Naik[5]

[1] Assistant Professor, Dept. of EEE, Sri Indu College of Engineering and Technology, Hyderabad,
[2 3 4] Research Student, Dept. of EEE Sri Indu College of Engineering and Technoslogy, Hyderabad,

Abstract. The important power quality worries presently is the extent of disturbances. Shunt active filters generally registered in power circulation grids to lighten current wave disturbance & balance the reactive power. At here instant reactive power theory is employ to get attribution balance current for the command of the shunt active filter [5] & hysteresis current controller is employed to incorporate it accurately. Hysteresis current controller is one of the easiest current control processes & the better approved one for active power filter applications, but it endures though an unlike switching frequency, to trounce this drawback an ovate fuzzy hysteresis current controller is being preferred. Presently used controller is designed by clarity as an output of decreasing the length of computations that construct it improve speedy & not depend on burden specifications. The structure was designed & replicates using MATLAB/SIMULINK. The outputs are shown & described they represent the accurate of the used fuzzy hysteresis controller in increasing the PWM characteristics & thus raise the shunt active power filter characteristics.

Keywords: - Shunt active filter, harmonics, hysteresis current controller, PWM

1. Introduction

Power electronic switching apparatus in affiliation with not obey ohms law burdens tenets huge disturbances effect in power system because of the natural characteristics of map out disturbed current & reactive power from Input. This makes happen potential unequal & neutral currents fault in power system. Along the deformity of current & potential wave shape owing to existence of disturbances in sine wave problem the power system device are linked to keep fixed & good power distribution in the power system. Crucial problems contain more heating, ringing effect, LPF, more burden, interaction & power disturbance. Thus to increase the conquest it needs to remove unwanted signals from power avail network (1)

2. Modeling of Shunt Active Filter & Hysteresis Current Controller

This filter is designed in same as to the power system loop anywhere a origin of disturbance in wave is exist. The aim is to eliminate harmonics produced in the non linear loads in Power systems by producing current same to Harmonic current phase opposition with 180 degree angle. Commonly sapf utilize igbt inverter which produces difference in current to repay the harmonic term of I_L to maintain input current sine wave. Fundamental presentation of sapf is shown in figure1. Comparing disturbance in current wave in sapf can be produced by employing dissimilar current maintain process to enlarge the functioning of the arrangement by diminishing disturbance in current wave existing in the I_L.The p-q process operates on operating definition as its immediately measured power with the immediate potential & current in 3-⌀ circuits[2]-[4].

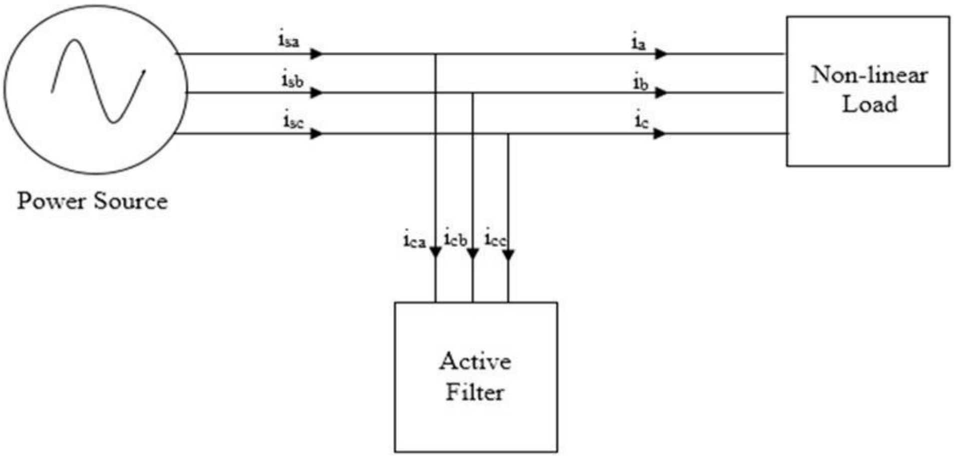

Figure 1 : Shunt active filter

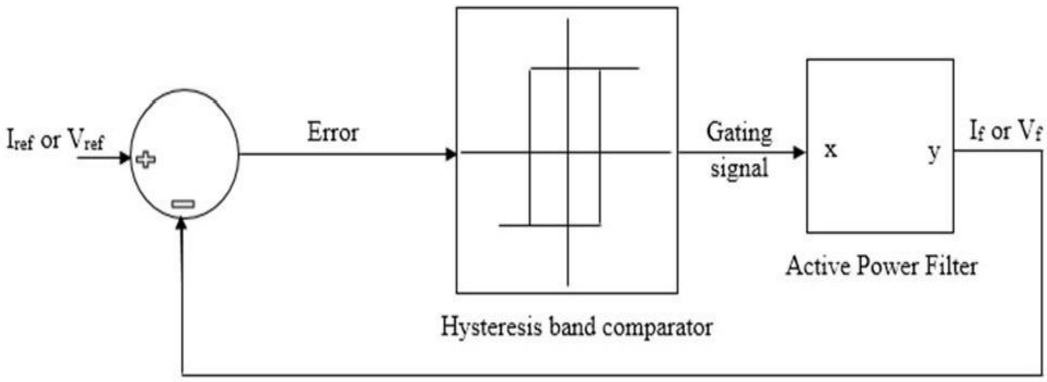

Figure 2: Hysteresis controller control logic

Hence, higher end hysteresis band= I_{re}+ $I_{err\ (max)}$ & where, I_{re} = resource Current

Lower end hysteresis band= I_{re}- $I_{err\ (min)}$ I_{err} = incorrect Current

As a result, the hysteresis band width= 2*I_{err}

Thus lower the bandwidth betters the precision.

The D-Q process is used to differentiate the harmonic portions from the basic portions by creating note shape current by help of synchronous note shape process. In synchronous note shape process park modification is taken out to change 3 burden current into synchronous note shape current to filter [5] the disturbances in input current. Fig 3 shows the D-Q process control strategy.

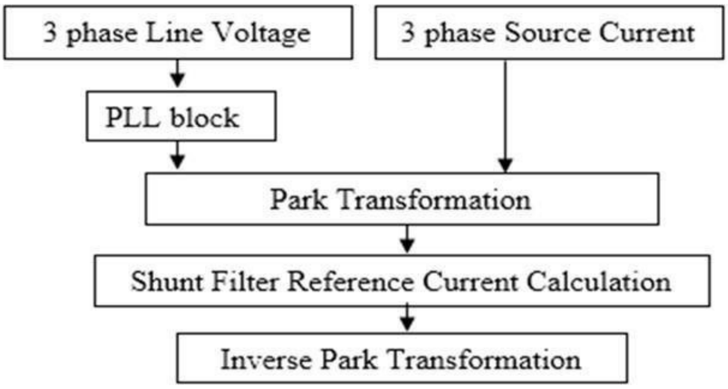

Figure 3: D-Q process control strategy

3. Controller Design

Design Parameters of potential 400v & frequency of 50Hz system for MATLAB output is conducted on a equilibrium Non Linear burden having of an R-L budren & a bridge rectifier as given in table.

Coupled Inductor	1mH
Coupled Resistor	0.01Ω
Dc coupled capacitor	1100μF
supply inductor	0.05mH
Supply resistor	0.1Ω
Load resistor	0.001Ω
Load inductor	1μH

Table1.SAPF values description

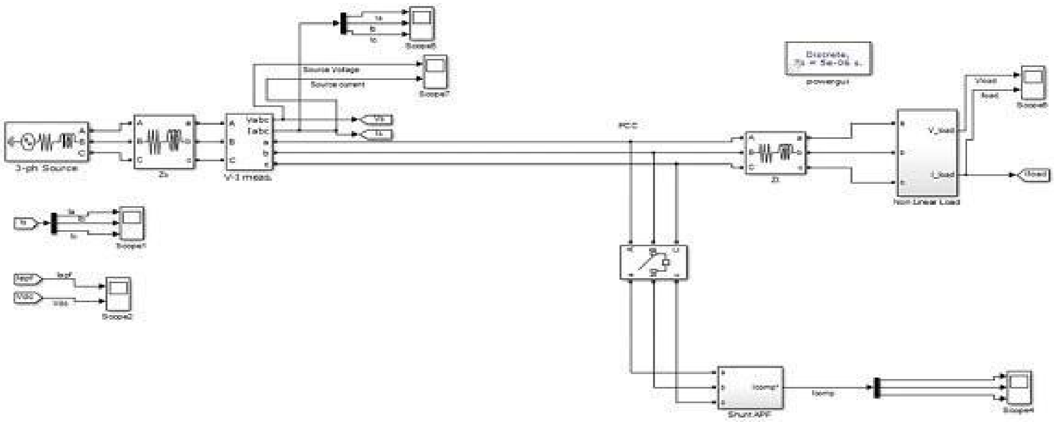

Figure 4: Shunt active power filter in simulation domain

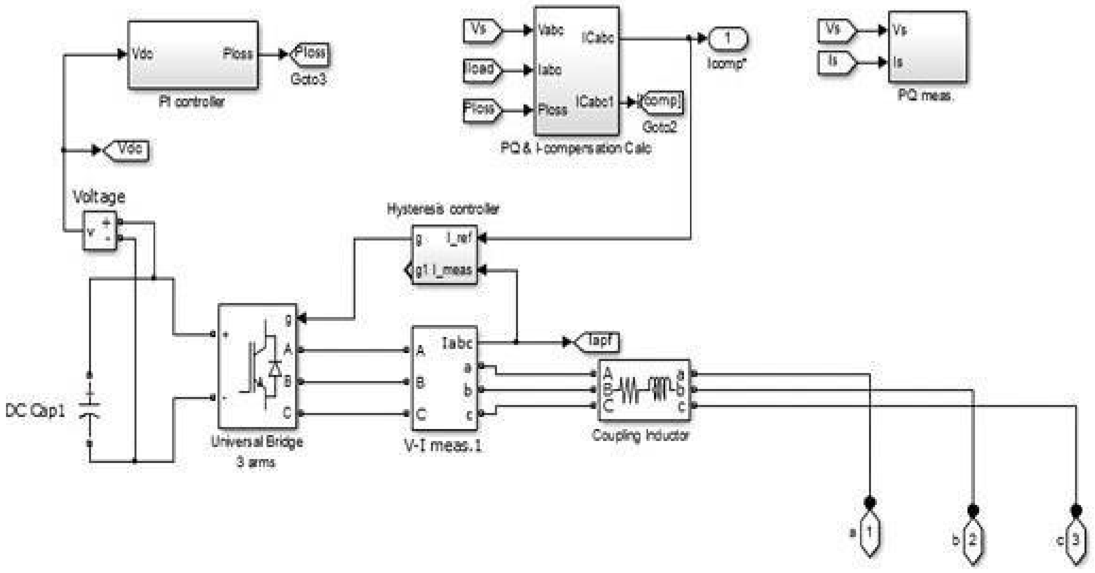

Figure 5: Shunt APF with p-q process in matlab domain

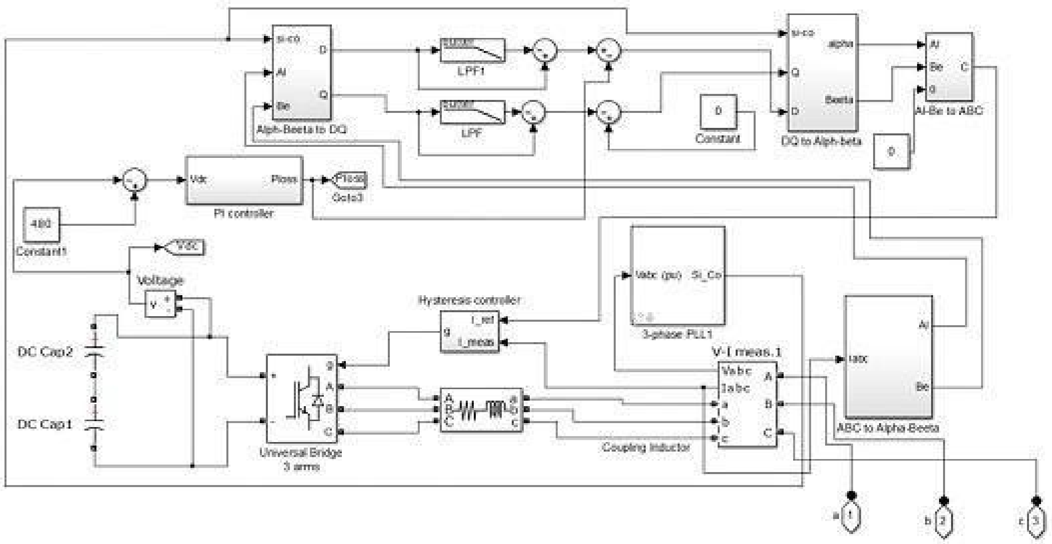

Figure 6: Shunt APF with d-q process in matlab domain

4. SIMULATION OUTPUTS

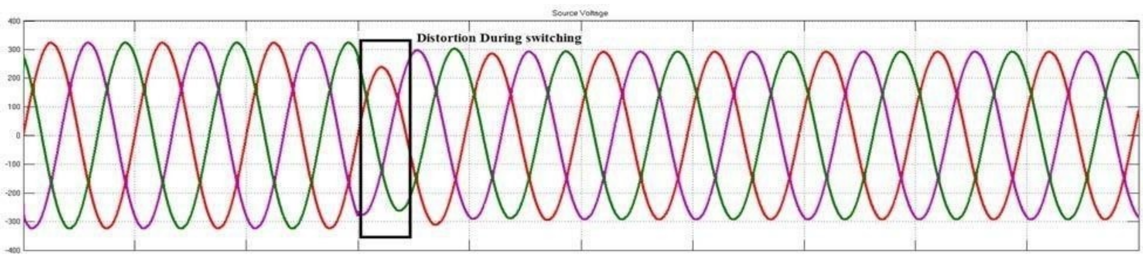

Figure 7: Source Potential prior & later filtering with p-q process

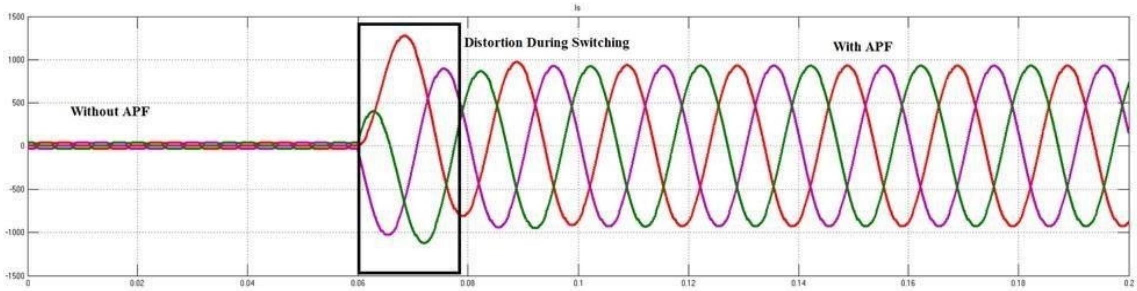

Figure 8: input Current prior & later filtering with p-q process

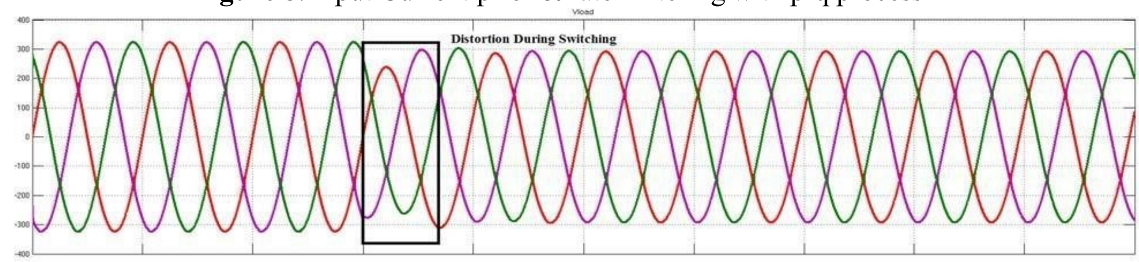

Figure 9: Load Potential prior & later filtering with p-qprocess

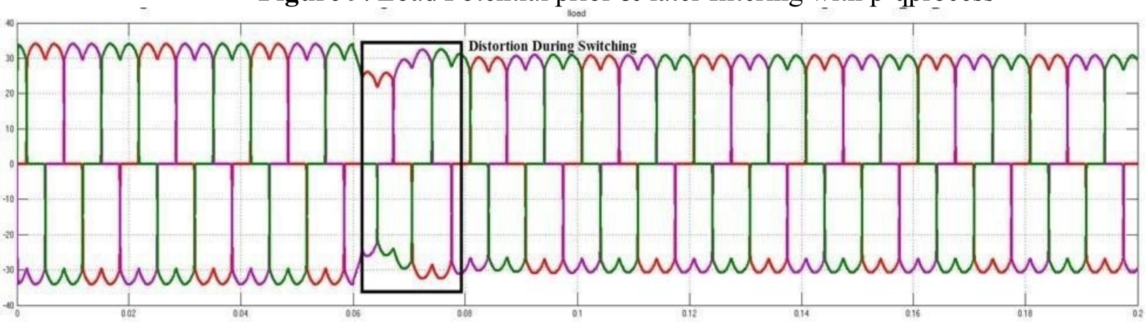

Figure 10: Load Current prior & later filtering with p-q process

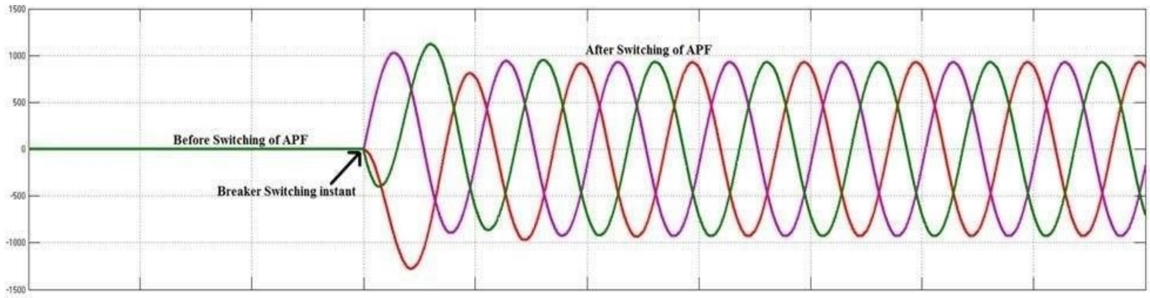

Figure 11: APF Current prior & later filtering with p-qprocess

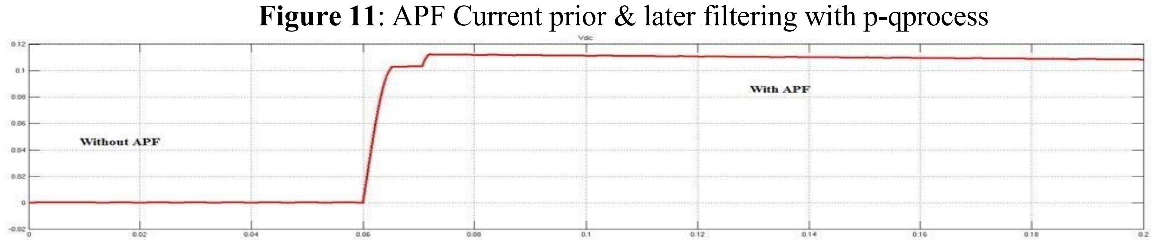

Figure 12: dc connected Potential prior & later filtering with p-q process

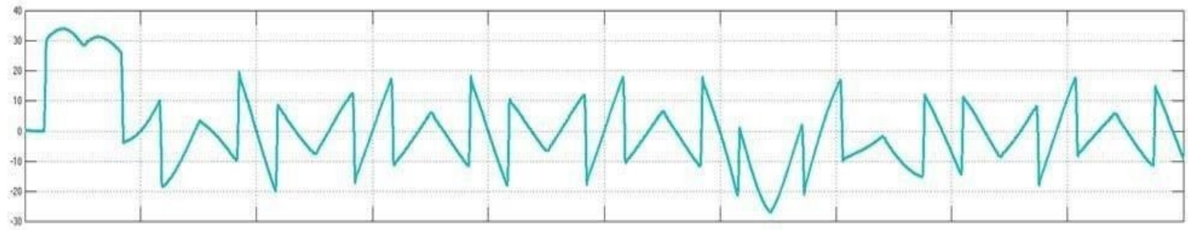

Figure 13: Compensated Current Wave shape

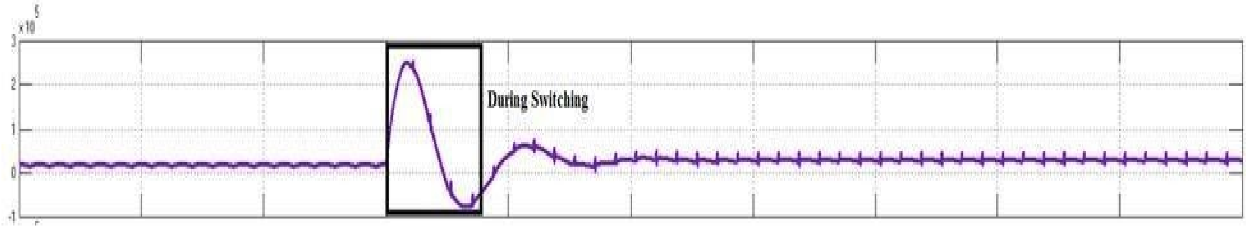

Figure 14: Active Power Wave shape

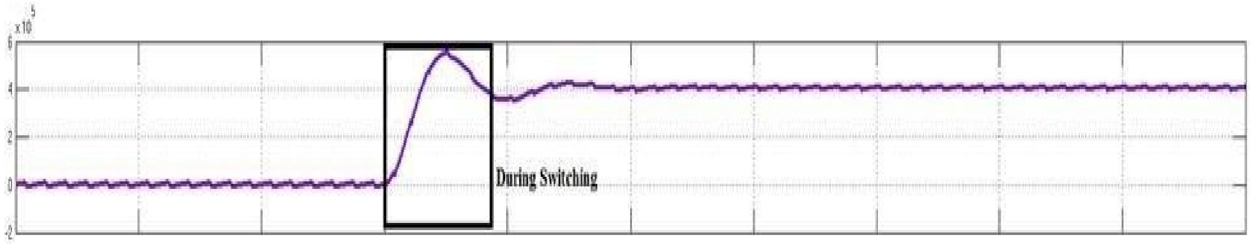

Figure 15: Reactive Power Wave shape

Simulink output with D-Q control strategy

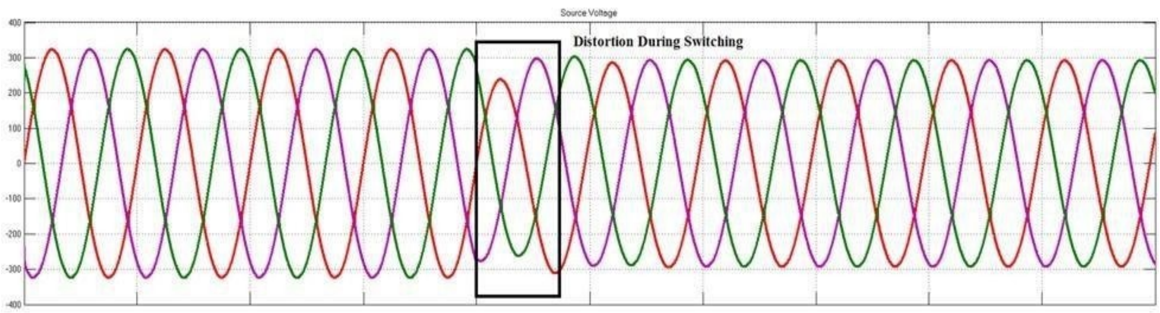

Figure 16: Source Potential prior & later filtering with d-q process

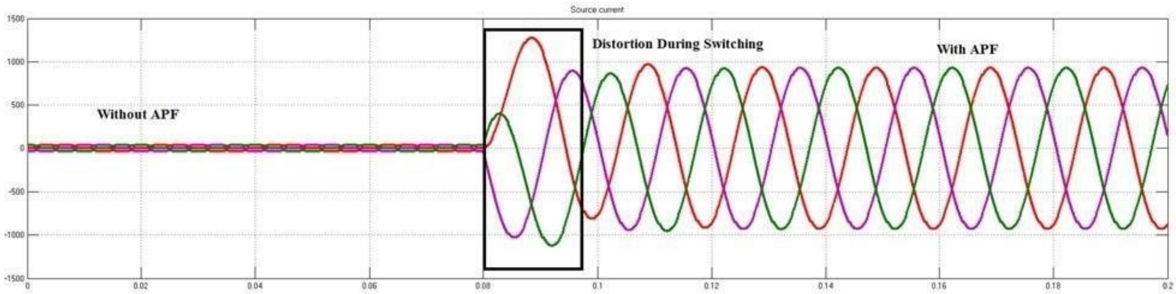

Figure 17: Source Current prior & later filtering with d-q process

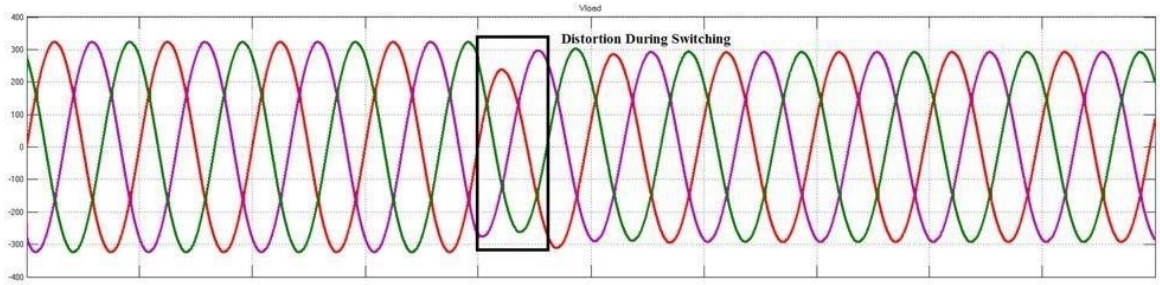

Figure 18: Load Potential prior & later filtering with d-q process

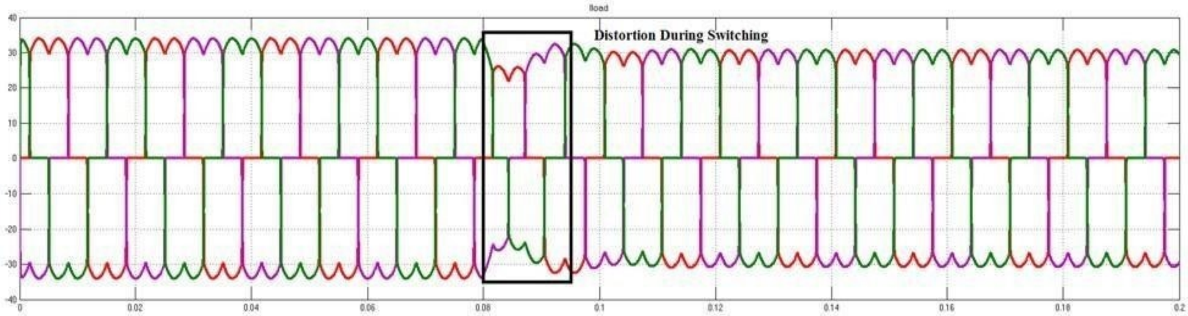

Figure 19: Load Current prior & later filtering with d-q process

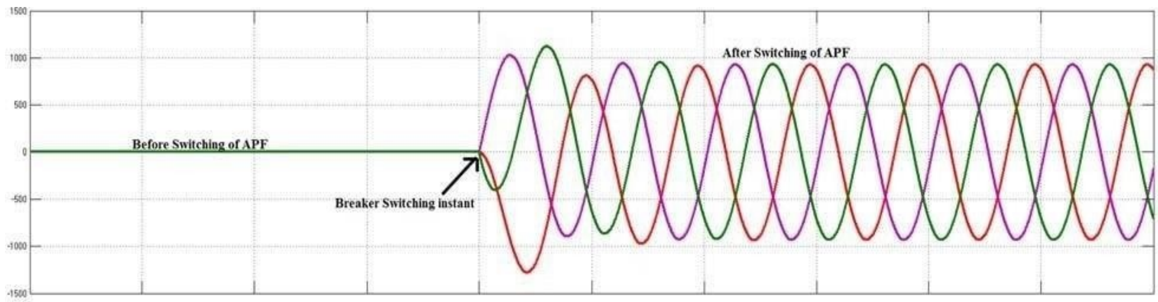

Figure 20: APF Current prior & later filtering with d-q process

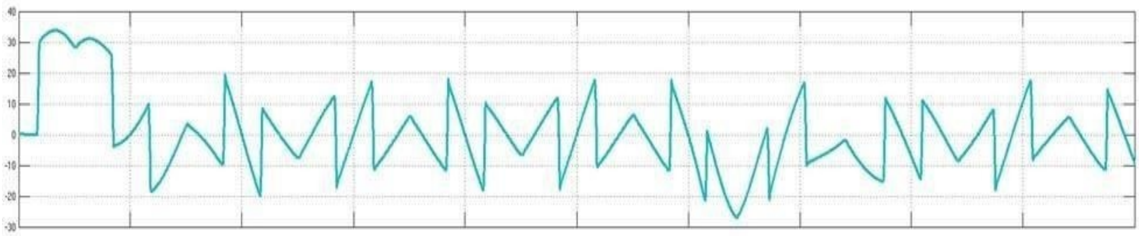

Figure 21: Compensating Current Wave shape

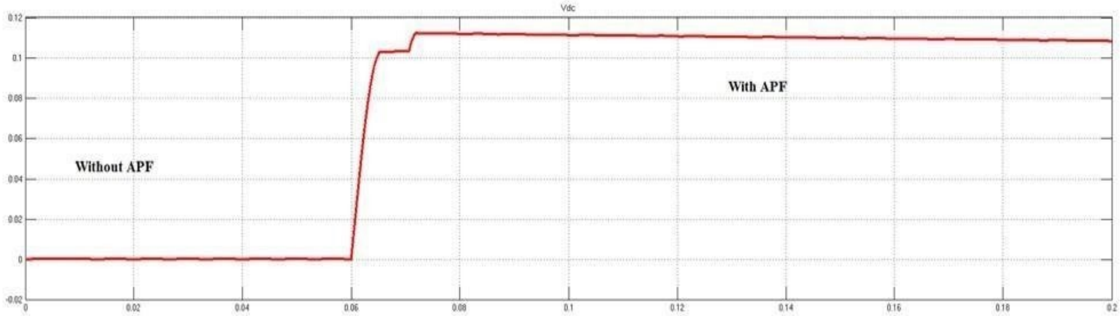

Figure 22: DC link Potential prior & later filtering with d-q process

5. Conclusion

It is effectively shown from FFT process of the mat lab /simulink pattern of the circuit including & lack of filter [6] that the harmonic element exists in the input is compared by applying filter. Additionally harmonic is compared to a large scale while make use of d-q control process alternately of p-q i.e. total harmonic distortion of input current is nearly diminished 50% while employing the d-q process. In further days it is feasible to get best process than d-q current control process to remove disturbances in power usage structure including continue constantly & constancy of process by talking pwm current controller.

6. References

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