



A HYBRID INTERLINE POWER QUALITY CONDITIONER USING POWER QUALITY

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ABSTRACT:

A Power quality issue is an event showed as a nonstandard voltage, current or recurrence that outcomes in a disappointment or a mis-operation of end client types of gear. Utility dissemination systems, touchy mechanical burdens and basic business operations experience the ill effects of different sorts of blackouts and administration interferences which can cost noteworthy monetary misfortunes. With the rebuilding of force frameworks and with moving pattern towards conveyed and scattered era, the issue of force quality is going to take more up to date measurements. In creating nations like India, where the variety of force recurrence and numerous such different determinants of force quality are themselves a genuine inquiry, it is extremely imperative to step in this heading. The present work is to distinguish the conspicuous worries around there and subsequently the measures that can improve the nature of the force are prescribed. This paper displays the improvement of voltage hangs/swell; symphonious twisting and low power component utilizing Distribution Static Compensator (D-STATCOM). The model depends on the Voltage Source Converter (VSC) rule. The D-STATCOM infuses a current into the framework to alleviate the voltage droops/swell. to enhance symphonious contortion and low power variable. The recreations were performed utilizing MATLAB SIMULINK rendition R2009b.

Keywords- D-STATCOM, Total harmonics Distortion (THD), Voltage Sag/swell, Voltage Source Converter (VSC).

1. INTRODUCTION:

The expansion of nonlinear burdens because of the multiplication of electronic hardware causes power quality in the force framework to fall apart. Symphonious current drawn from a supply by the nonlinear burden results in the bending of the supply voltage waveform at the purpose of regular coupling (PCC) because of the source impedance. Both bended

current and voltage might bring about end-client gear to glitch, conductors to overheat and might decrease the effectiveness and future of the hardware associated at the PCC. Customarily, a detached LC power channel is utilized to wipe out current music when it is associated in parallel with the heap [1]. This pay gear has a few downsides [2]–[4], because of which the inactive channel can't give a complete

arrangement. These inconveniences are fundamentally the accompanying.

— The pay qualities vigorously rely on upon the framework impedance in light of the fact that the channel impedance must be littler than the source impedance so as to dispense with source current sounds.

— Overloads can happen in the aloof channel because of the course of sounds originating from nonlinear burdens associated close to the association purpose of the uninvolved channel.

— They are not suitable for variable burdens, subsequent to, on one hand, they are intended for a particular responsive force, and then again, the variety of the heap impedance can detune the channel.

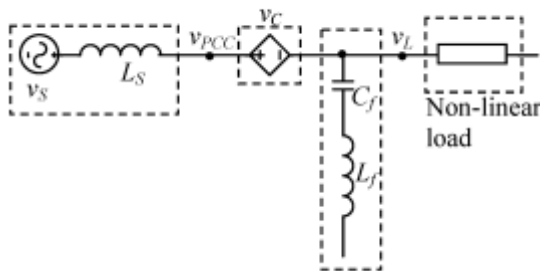


Fig. 1. Series active filter and parallel passive filter.

— Series and/or parallel resonances with whatever remains of the framework can show up.

A dynamic force channel, APF, regularly comprises of a three-phase pulsewidth regulation (PWM) voltage source inverter [5]. At the point when this hardware is associated in arrangement to the air conditioner source impedance it is conceivable to enhance the

remuneration attributes of the latent channels in parallel association [6]. This topology is appeared in Fig. 1, where the dynamic channel is spoken to by a controlled source, where is the voltage that the inverter ought to produce to accomplish the target of the proposed control calculation.

Diverse procedures have been connected to get a control signal for the dynamic channel . One such is the era of a voltage relative to the source current music [1], [2]. With this control calculation, the end of arrangement and/or parallel resonances with whatever is left of the framework is conceivable. The dynamic channel can keep the detached channel turning into a sounds channel on the nearby loads. Moreover, it can keep the remuneration highlights relying upon the framework impedance. From the hypothetical perspective, the perfect circumstance would be that the proportionality consistent, k , between the dynamic channel yield voltage and source current music, had a high esteem. Be that as it may, at the utmost this would be a vast esteem and would imply that the control goal was difficult to accomplish. The picked k quality is normally little to stay away from high power dynamic channels and dangers in the framework. In any case, the decision of the proper k quality is an unsolved inquiry since it is identified with the detached channel and the source impedance values. Plus, this procedure is not suitable for use in frameworks with variable burdens in light of the fact that the latent channel responsive force is steady, and along these lines, the set remuneration gear and load has a variable force component.

In another proposed control method, the APF produces a voltage waveform like the voltage sounds at the heap side yet in restriction [3]. This

methodology just keeps the parallel inactive channel contingent upon the source impedance; alternate impediments of the detached channel all things considered remain.

Other control techniques joining both the above have been proposed to enhance the parallel detached channel remuneration attributes [4], [5], yet they keep on misery from the trouble of finding a proper worth for the APF pick up k

At long last, another methodology has as of late been proposed [6]. It recommends that the dynamic channel produces a voltage which remunerates the detached channel and load receptive force, so it permits the present music to be killed. The count calculation depends on the momentary receptive force hypothesis [1]. There, the control target is to accomplish consistent force in the source side.

In this paper another control technique taking into account the double plan of the electric force vectorial hypothesis, [1] is proposed. For this, an adjusted and resistive burden is considered as reference burden. The procedure gets the voltage that the dynamic channel needs to produce to accomplish the target of accomplishing perfect conduct for the set half and half channel load. At the point when the source voltages are sinusoidal and adjusted the force variable is solidarity, as such, the heap responsive force is remunerated and the source current sounds are killed. By this implies, it is conceivable to enhance the detached channel pay attributes without relying upon the framework impedance, since the set burden channel would show resistive conduct. It additionally maintains a strategic distance from the peril that the aloof channel acts as a consonant channel of close loads and in like manner the danger

of conceivable arrangement and/or parallel resonances with whatever remains of the framework. What's more, the remuneration is additionally conceivable with variable burdens, not influencing the conceivable the uninvolved channel detuning

In spite of the fact that the APF arrangement control taking into account the prompt receptive force hypothesis is not new, in this paper the creators propose another plan that has outcomes in the control circle outline. Truth be told, the prompt responsive force here is characterized from a speck item while in [6] it is characterized as a cross item; this outcomes in a striking rearrangements in the execution of the reference era strategy. The last advancement permits any pay technique to be gotten, among them, unit power variable.

The repaid electric framework was reproduced in MATLAB-Simulink, and the technique was connected to a three-stage framework with adjusted and unequal burdens. The reproduction results used to confirm the hypothetical conduct are exhibited. At last, an exploratory model was fabricated and its conduct checked. Exploratory results are additionally exhibited.

I. POWER QUALITY STANDARDS

To guarantee the harmonization of enactment inside of the European Community, without which the free trade of products and administrations would be influenced, a few orders have been discharged. One of such mandates is the Council Directive 85/374, identified with the risk for imperfect items. Its second article characterizes power as item and in this sense it gets to be important to build up its qualities.

A. EN 50160

"Voltage Characteristics of Electricity Supplied by Public Distribution Systems" – This standard, distributed by CENELEC (European Committee for Electrotechnical Standardization) characterizes the fundamental qualities of the low and medium voltage supplied by open circulation systems at the PCC (purpose of normal coupling) [1].

THE NOMINAL VOLTAGE

Odd harmonics				Even harmonics	
Non-multiple of 3		Multiple of 3			
Order n	Relative voltage (%)	Order n	Relative voltage (%)	Order n	Relative voltage (%)
5	6.0	3	5.0	2	2.0
7	5.0	9	1.5	4	1.0
11	3.5	15	0.5	6 - 24	0.5
13	3.0	21	0.5		
17	2.0				
19	1.5				
23	1.5				
25	1.5				

Note: The values corresponding to harmonics of order greater than 25, in general low and very unpredictable, as a cause of the resonance effects, are not indicated in this table

This standard also establishes that voltage total harmonic distortion (THD), including the first 40 harmonics, must not exceed 8%.

B. IEC 61000

This arrangement of IEC (International Electrotechnical Commission) norms [2-4] is worried with electromagnetic similarity (EMC) and incorporates the accompanying parts:

1. General – General contemplations, definitions and phrasing: 61000-1-x.
2. Environment – Description of nature, characterization of the earth, similarity levels: 61000-2-x.

3. Limits – Emission limits, safety limits: 61000-3-x.
4. Testing and Measurement Techniques – Provides systems and estimation rules so as to guarantee the consistence with alternate parts of the standard: 61000-4-x.
5. Establishment and relief rules – Provides rules in the use of hardware, for example, channels, compensators, surge arresters, and so forth, keeping in mind the end goal to take care of the issues related with force quality: 61000-5-x.
6. Bland norms – Sets up the required resistance levels for broadly useful supplies or for particular sorts of gear: 61000-6-x.
7. Incidental: 61000-9-x

TABLE II

COMPATIBILITY LEVELS FOR INDIVIDUAL HARMONIC VOLTAGES IN PUBLIC LOW-VOLTAGE NETWORKS

Odd harmonics non-multiple of 3		Odd harmonics multiple of 3		Even harmonics	
Order n	Harmonic Voltage (%)	Order n	Harmonic Voltage (%)	Order n	Harmonic Voltage (%)
5	6	3	5	2	2
7	5	9	1.5	4	1
11	3,5	15	0.3	6	0.5
13	3	21	0.2	8	0.5
17	2	>21	0.2	10	0.5
19	1.5			12	0.2
23	1.5			>12	0.2
25	1.5				
>25	0.2 + 0.5 x 25/n				

TABLE III

COMPATIBILITY LEVELS FOR HARMONICS

	Class 1	Class 2	Class 3
Total Harmonic Distortion	5%	8%	10%

Class 1 applies to secured systems and it has the most reduced lower similarity levels (lower than that open systems). It concerns the utilization of gadgets and types of gear extremely touchy to electric aggravations, v. g. innovative research facilities instrumentation, certain mechanization and defensive types of gear, particular PCs, and so forth.

Class 2 applies to PCC and to the inside interfacing focuses in the general modern environment. It additionally applies to open systems.

Class 3 is just pertinent to interior association purposes of the modern situations. The similarity level is more noteworthy than that of the class 2 for specific unsettling influences. This class ought to dependably be considered at whatever point one of these conditions is met:

- Most of the loads are fed through converters.
- There are melting machines.
- Large capacity drives are started up very often.
- The loads change rapidly.

C. ANSI/IEEE 519-1992

By standard, which is in no time being upgraded, the dissemination organizations are in charge of keeping the nature of voltage in every one of their frameworks [5]. This standard sets up as far as possible for the diverse voltage levels of the electric systems.

Nominal Voltage at PCC U_n	Individual voltage distortion (%)	Total harmonic distortion (%)
$U_n \leq 69 \text{ kV}$	3.0	5.0
$69 \text{ kV} < U_n \leq 161 \text{ kV}$	1.5	2.5
$U_n > 161 \text{ kV}$	1.0	1.5

III. MITIGATION OF PQ PROBLEMS

There are two routes used to alleviate the force quality. To begin with is from client side and other from utility side. The principal way can be given as burden molding, which guarantees that gear is less touchy to power unsettling influences. The option answer for include a line molding frameworks that stifle or neutralizes the force framework aggravations. A few gadgets including flywheels, super-capacitors, other vitality stockpiling frameworks, consistent voltage transformers, clamor channel, confinement transformer, transient voltage surge silencer, consonant channels are utilized for the relief of particular PQ issues. Custom force gadgets (CPD) like DSTATCOM, DVR are equipped for relieving numerous PQ issues connected with utility conveyance and the end client machines. In any case, the vicinity of sounds is exceptionally unsafe for both the associated loads and additionally for the force framework associated with the network due consonant current stream.

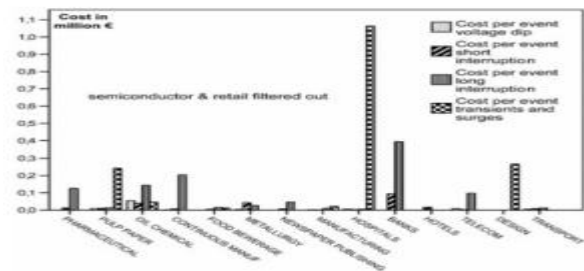


Fig.4 . The cost per event identified by the Survey

TABLE IV MAXIMUM DISTORTION LEVELS

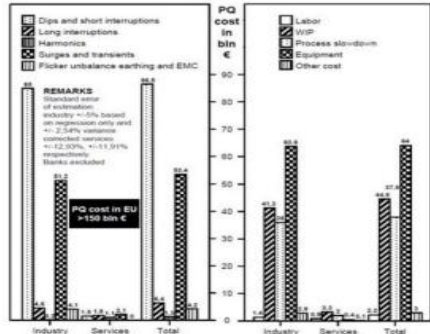
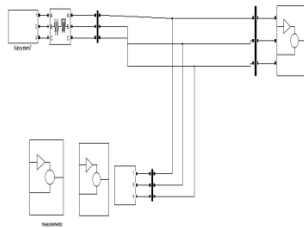


Fig.5 . Extrapolation of PQ cost to EU economy in LPQI surveyed sectors

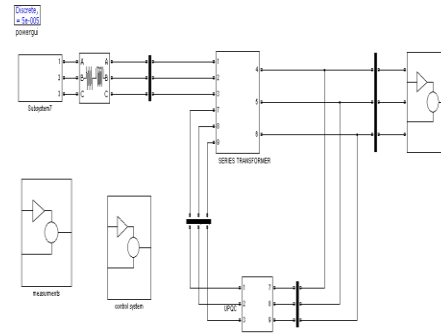
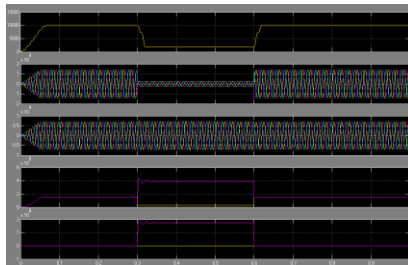
In this following paper we are going to discuss about reduction of harmonics by filtering. Following shows the two latest filtering methods of harmonics filtering & about the need of Inductively Active Filtering and its simulation results.

Simulation Results:

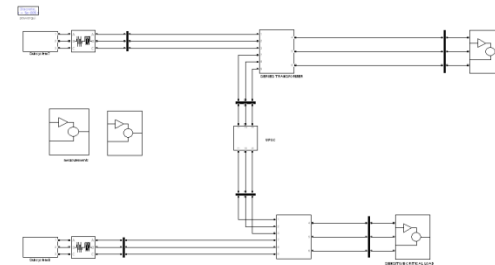
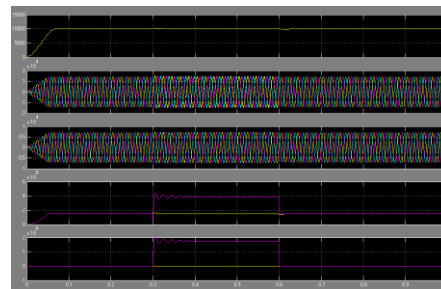
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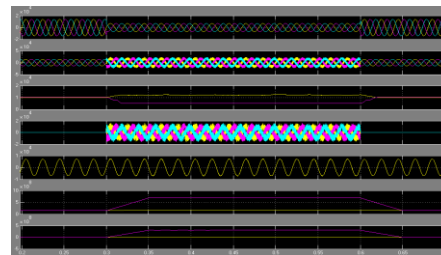
Without upqc



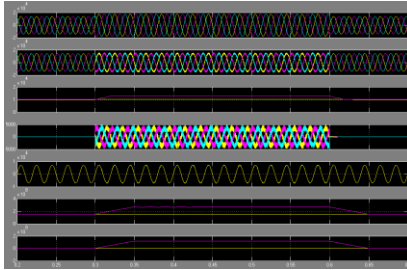
With upqc



sag IUPQC



Swell IUPQC



IV. CONCLUSION

A Very New Strategy for the force quality change in 3- ϕ matrix associated photovoltaic era framework was examined with productive technique for MPPT and battery vitality stockpiling framework to roll out operation free of improvements in barometrical condition, i.e. step change in sun oriented insolation. In this paper, a proposed channel, which is portrayed as an inductively separated converter transformer and a controlled FT branch, is proposed to enhance the PQ of the dispersion system (open network) and the powersupply framework (power buyer side) associated with nonlinear burdens. The execution of the photovoltaic framework with cross breed channel was examined under various burden conditions in MATLAB 2013a and yield appeared with the lessening of music and list/swell because of vacillations. This strategy can contribute PQ change for the general population system and the force shopper. It might likewise lessen the

requirement for force transformers that detach the nonlinear burdens from the dispersion system. It has potential application in mechanical force supply frameworks and dissemination systems interfaced with conveyed era.

V. REFERENCES

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