

# A Critical Evaluation of Islanding and Seamless Reconfiguration Technique for Microgrid System with Fuzzy Logic Controller Based UPQC Scheme

T V V Pavan Kumar, G Isaac, K Ramesh Babu

**Abstract-** *In this errand a wonderful control and coordination system for the proposed UPQC in a scattered age (DG)- based structure related microgrid ( $\mu$ G) structure is showed up. The control course of action of the presented UPQC  $\mu$ G is refreshed by executing a shrewd islanding and novel reconnection framework with diminished number of switches that will ensure trustworthy action of the  $\mu$ G without impedance. The shunt some bit of the UPQC Active Power Filter is put at the Point of Common Coupling (PCC) and plans some region of the UPQC is connected before the PCC and in framework with the structure. The dc connection can in like way be joined with the cutoff structure. A sharp islanding seeing attestation and reconnection methodology (IR) are appeared in the UPQC as a discretionary control. Beginning now and into the not too expelled, it is named as UPQC $\mu$ G-IR. The advantages of the proposed UPQC $\mu$ G-IR over the standard UPQC are to reimburse voltage impedance paying little heed to voltage list/swell, consonant, and responsive power pay in the interconnected mode. In the midst of the interconnected and islanded mode, DG converter with inspiration driving constraint will supply the dynamic power just and the shunt some bit of the UPQC will reimburse the responsive and symphonious power of the store. It in like way offers the DG converter to remain related in the midst of the voltage bothering impact including stage weave. A sharp islanding introduction and reconnection structure (IR) are showed up in the UPQC connecting delicate strategy for thinking as a discretionary control. In that capacity, it is named as UPQC $\mu$ G-IR. In the midst of the interconnected and islanded mode, DG converter with purpose of restriction will supply the dynamic power just and the shunt some bit of the UPQC will reimburse the responsive and symphonious power of the store. The age results are showed up by using Matlab/Simulink programming. Catchphrases: Distributed age (DG), quick islanding revelation (ISD), microgrid, control quality, sharp cross section, united power quality compensator (UPQC), cushy reason controller.*

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## I. PRESENTATION

The testing issues of a productive circumstance and mix of bound united power quality conditioner (UPQC) in circled age (DG)- based cross fragment related microgrid ( $\mu$ G) system are 1) Control unconventionalities for dynamic power trade; 2) ability to repay non-dynamic power in the midst of the islanded mode; and 3) difficulty in the most uncommon wildness wholeheartedly [1]. For a smooth power trade between the framework related structure and islanded mode, contrasting operational changes are showed up, for example against the islanding confirmation and reconnection deferrals and theory, and so forth [2], [4]. Unequivocally, these further extension the control abnormality of the microgrid systems. To extend the operational flexibility and to improve the power quality in cross portion related microgrid structures, another control approach condition and course of action technique for UPQC have been proposed in [3], which is named as UPQC $\mu$ G. In the UPQC  $\mu$ G integrated passed on structure, cut back scale make (with most uncommon) and shunt some piece of the UPQC $\mu$ G are put at the Point of normal coupling. The approach of the UPQC is put before the Point of normal coupling and in method with the framework. DC interface is connected with the point of confinement in like way, if present.

In this paper, the control logic for the exhibited UPQC  $\mu$ G and delicate structure for end controller in [4] is improved subsequently; it is named as UPQC  $\mu$ G-IR. The perfect conditions offered by the proposed UPQC  $\mu$ G-IR over the standard UPQC are as outputs for after. To watch the effect on the typical for voltage hang/swell and impedance for the systems .

Both in the interconnected and islanded modes, the  $\mu G$  give only the dynamic ability to the store. Along these lines, it can decrease the control drive of the DG converters. Islanding introduction and reconnection system are demonstrated in the proposed UPQC as a discretionary control. To keep up the errand in islanded mode and reconnection through the UPQC and pleasant, correspondence process between the UPQC  $\mu G$  and  $\mu G$  structure is referenced in [5]. In this paper, the control strategy of the showed UPQC  $\mu G$  and delicate legitimization controller in [6] is improved by finishing a sharp islanding and novel reconnection technique with diminished number of switches that will ensure seamless errand of the  $\mu G$  without square [7]. Hence, it is named as UPQC  $\mu G$ -IR. The focal centers offered by the proposed UPQC  $\mu G$ -IR over the standard UPQC locales examines for after.

□ It can reimburse voltage check/hang/swell and non-dynamic current in the interconnected mode.

□ Therefore, the DG converter can regardless be connected with the structure in the midst of these damage conditions. As such, it revives the operational flexibility of the DG converters/ $\mu G$  system, everything considered, which is besides lit up in a later territory.

□ Shunt part of the UPQC Active Power Filter (APFsh) can keep up relationship in the midst of the islanded mode other than reimburses the non-dynamic Reactive and Harmonic Power (QH) power of the store.

□ Both in the interconnected and islanded modes, the  $\mu G$  gives only the dynamic ability to the stack. All things considered, it can reduce the control multifaceted nature of the DG converters.

□ Islanding certification and reconnection structure are introduced in the proposed UPQC as an assistant control. A correspondence between the UPQC and  $\mu G$  is in like course given in the extra control. The DG converters may not require having islanding seeing proof and reconnection joins into their control structure [8-12].

## II. LITERATURE REVIEW

Distinctive research capacities beginning at now exist in the synthesis that repay control quality issue in power working framework. Some of them are analyzed here. Sobha Rani Injeti et al. have displayed another remuneration structure executed utilizing an UPQC type compensator. Their proposed pay plan improves the framework control quality, manhandling absolutely DC- transport vitality putting away and dynamic power sharing between UPQC converters, highlights not present in DVR and D- STATCOM compensators. The internal control technique depends upon the association of dynamic and responsive power in the strategy and shunt converters of the UPQC and the trading of power between converters through UPQC DC- Link. They have demonstrated that their proposed calculation was convincing and reliable quality exact, and strong in separating and the regularly utilized in reverse/forward broadness approach for feebly fit structures.

Yash Pal et al. have proposed a control framework for a three-arrange four-wire UPQC for an update of various PQ issues. The UPQC is bored by the trade off obviously of activity and shunt dynamic power channels (APFs) and both APFs share an average DC transport capacitor. The shunt APF is perceived by methods for a three-compose, four leg voltage source inverter (VSI) and the approach APF is perceived by procedures for a three-orchestrate, three legs VSI. A unit vector position structure (UTT) based control framework has been utilized to get the reference signals for game-plan APF, anyway the ICos $\Phi$  hypothesis has been utilized for the control of Shunt APF. The execution of the finished control estimation has been reviewed the degree that control factor rectification, load changing, source fair current help, voltage and current music relief, equalization of voltage rundown and swell, and voltage dunks in a three-arrange four-wire course structure under a different blend of straight and non-direct loads. In the control framework, the current/voltage control has been related on the basic supply streams/voltages as opposed to quick changing APFs streams/voltages, and in this way the computational deferral and the required sensors have been diminished. The engendering results have been gotten utilizing the MATLAB/Simulink and it demonstrates that the proposed control framework could keep up the handiness of the UPQC.

M Siah et al. have proposed a course of action of joined activity of UPQC and PV appear. Their proposed structure is made out of course of action and shunt inverters, PV gathering and DC/DC converter which have talented for repaying the voltage hang, swell, deterrent, music and responsive power in both islanding and interconnected modes. The upsides of their proposed framework are 1) it reduces the cost of PV interface inverter related with cross segment by applying UPQC shunt inverter and 2) it has the point of confinement of repaying the voltage interference utilizing UPQC due to accomplice PV to DC partner. In the proposed structure, P&O procedure has been utilized to achieve the most remarkable power explanation behind PV pack. PSCAD/EMTDC programming has been utilized for isolating endeavor of the proposed structure and the preoccupation results have displayed that their proposed framework works suitably. K S Ravi Kumar et al. have proposed FLC controller and ANN controller for UPQC to refresh the power thought of power stream compose. The proposed FLC and ANN were fit for giving uncommon static and dynamic presentations wandered from PID controller. UPQC execution essentially relies upon how unequivocally and rapidly reference signals were prompted. By utilizing standard Akagi's rule reference signals was settled. Utilizing standard compensator information, a FLC was tuned with enormous number of server farms. By then normal compensator was supplanted with comfortable technique for thinking controller and reenacted utilizing Matlab/Simulink for R-L load utilizing uncontrolled rectifier.

They showed that the UPQC performed better with FLC proposed plan and disposes of both voltage also as present sounds enough. The ANN controller likewise performs in a correspondingly with genuinely better voltage pay It was comparatively seen that the reaction time for enrollment of pay signals decreased fundamentally with improved precision. They in like way shown that it had expansive reaction essentialness for yielding persuading pay in the structure.

K. Manimala et al. have depicted the programmed grouping of intensity quality occasions utilizing Wavelet Packet Transform (WPT) and Support Vector Machines (SVM). The highlights of the unsettling influence signals were removed utilizing WPT and given to the SVM for compelling arrangement. The two advancement methods were utilized to their proposed grouping framework, for example, hereditary calculation and recreated toughening. Their proposed framework was identified the best discriminative highlights and assessed the best SVM bit parameters in a completely programmed way. The viability of their proposed recognition strategy was contrasted and the ordinary parameter enhancement strategies like framework seek technique, neural classifiers like Probabilistic Neural Network (PNN), fluffy k-closest neighbor classifier (FkNN). They have demonstrated that their proposed strategy was dependable and delivers reliably better outcomes.

### III. WORKING PRINCIPLE

The joining arrangement of the proposed UPQC $\mu$ G-IR to a structure related and DG made  $\mu$ G structure is appeared. 1(a). S2 and S3 are the breaker switches that are used to island and reconnect the  $\mu$ G structure to the cross piece as made by the optional control of the UPQC $\mu$ G-IR. The working guideline amidst the interconnected and islanded mode for this structure is appeared in Fig.1 (b) and (c). The errand of UPQC $\mu$ G-IR can be detached into two modes.

#### A. Interconnected Mode

In this mode, as appeared in Fig. 1(b), the running with holds:

- 1) The DG source passes on just the central unique ability to the framework, collecting, and weight;
- 2) The APFsh repays the responsive and symphonious (QH)power of the nonlinear weight to keep the Total Harmonic Distortion at the PCC inside the IEEE standard most remote point;
- 3) Voltage hang/swell/interference can be repaid bythe dynamic power from the framework/verifying through the APFse,t. The DG converter does not see any kindof voltage disturbing impact at the PCC and starting now and into the not all that inaccessible stays related in any condition;
- 4) If the voltage impedance/dull out happens, UPQC sends a headway inside a preset time to the DG converter to be islanded.

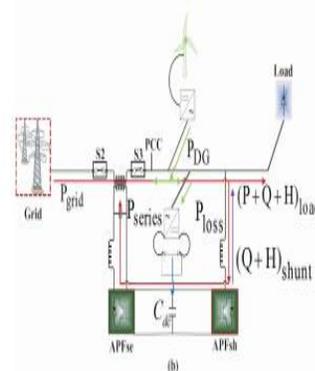
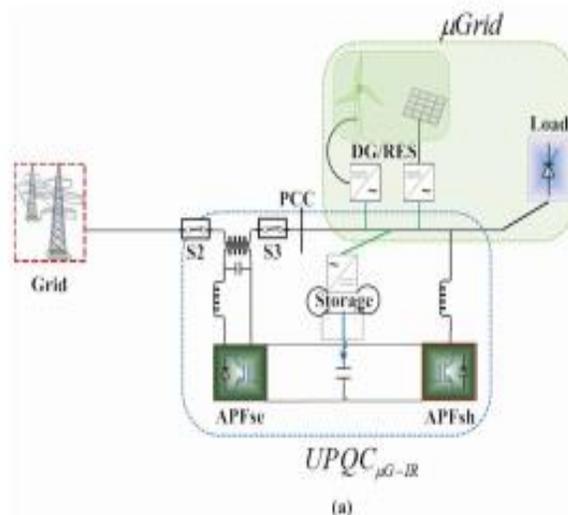
#### B. Islanded Mode

For this condition, as appeared in Fig. 1(c), the running with holds:

- 1) TheAPFse is pulled back in the midst of the cross territory dissatisfaction and DG converter stays related with keep up the voltage atPCC;

- 2) The APFsh still reimburses the nonnative force of the nonlinear burden to surrender or keep undistorted current at PCC for other direct loads (foreseeing any);
- 3) Therefore, DG converter (with purpose of constraint) passes on simply the dynamic power and thus shouldn't be withdrawn from the structure;
- 4) The APFse is reconnected once the structure control is open.

From Fig.1(a)– (c), plainly the UPQC $\mu$ G-IR requires two switches isolated and four, as required for UPQC $\mu$ G in [4]. A detail of the trading structure is bankrupt down in the controller plan a zone.



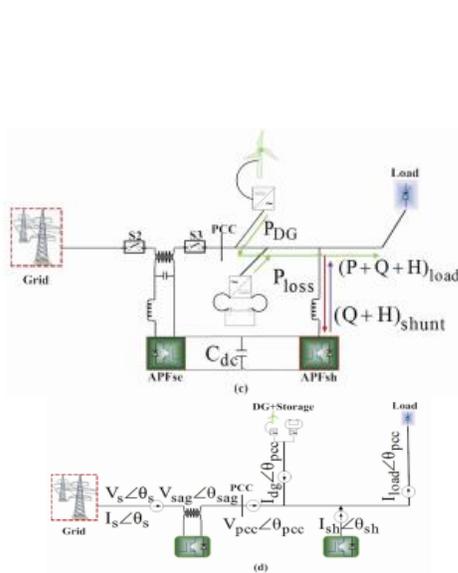


Fig.1. (a) Integration technique of the UPQCμG-IR. Working principle in (b) interconnected mode, (c) islanded mode, and (d) fundamental frequency representation.

#### IV. CONTROLLER DESIGN

The square diagram of the proposed UPQCμG-IR controller is appeared in Fig.4. It has dubious real settlement from the UPQC controller close to the extra islanding presentation and reconnection limits.

A correspondence channel (signals exchange) between the proposed UPQCμG-IR and the μG is in like manner required for the smooth development. These signs age depend on the fast review/swell/interfere with/supply dissatisfaction conditions. This errand is performed in Level 2 (optional control) of the unquestionable leveled control. Level 1 manages the major control of the UPQC to play out their critical motivations behind constraint in the interconnected and the islanded mode. The general affiliation structure and control system are to improve the power quality amidst interconnected and islanded modes. This breakers seeing islanding and reconnection that guarantees the DG converter remains related and supply dynamic capacity to the store. This decays the control multifaceted nature of the converter likewise as the power disappointment trustworthiness in the islanded mode. The five standard segments of the proposed UPQCμG-IR controller are: 1) positive party a territory; 2) outline part (APFse) control; 3) shunt part (APFsh) control; 4) watchful islanding accreditation (IsD); and 5) synchronization and reconnection (SynRec). As the IsD and SynRec highlights are new in UPQC, in this way, these have been portrayed in sub articles.

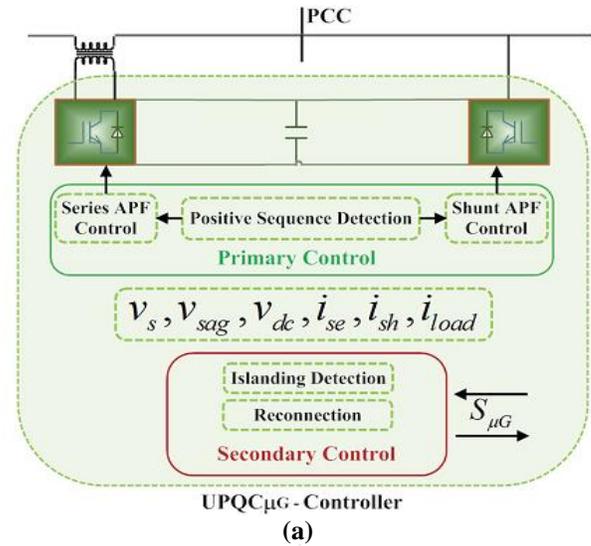


Fig.4. Block diagram of the UPQCμG-IR. (a) Controller. (b) Control algorithm.

#### A. Intelligent Islanding Detection

Thinking about the future models toward the great framework and μG task as for the dispersal grid, the breaking point of: 1) keeping up relationship amidst structure charge condition; 2) typically observing the islanded condition; and 3) reconnecting after the cross region blame are the most essential highlights of the μG structure. Everything considered, the circumstance of APFse in the proposed trade off strategy for the framework perceive an essential occupation by widening the operational flexibility of the DG converter in the μG structure.

Regardless of the islanding request, changing the control framework from forward and in turn around progress to voltage control may result in veritable voltage deviations and it ends up real when the islanding seeing confirmation is yielded by sensibility of various leveled control.

In that limit, enduring voltage exchange control between the framework related and constrained controlled modes is crucial. Both naughty and direct current control systems are proposed in [2] to compose the voltage vagrants experiencing fundamental change mode, yet these then advancement the control tendency of the  $\mu$ G converters.

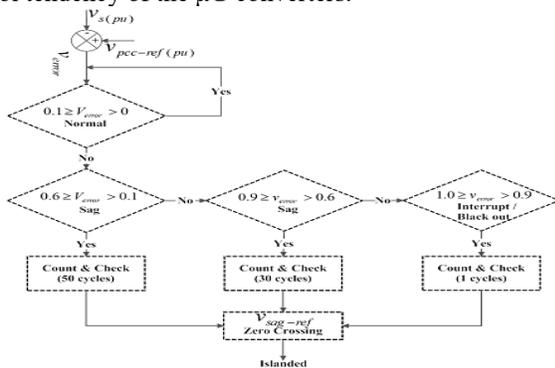


Fig.5. Algorithm for IsD method in UPQC $\mu$ G-IR.

For the state of intensity quality issues, it is kept an eye on that over 95% of voltage hangs can be compensated by immersing a voltage of up to 60% of the verifiable voltage, with a biggest term of 30 cycles. In like way, in light of the islanding region need and hang/swell/bounce in with compensation, islanding is seen and a standard  $\mu$ G-I, as showed up in Fig.4(b), is in like route made in the proposed UPQC $\mu$ G-IR to trade it to the DG converters. As the APIn the occasion of power quality issues, it is kept an eye on that over 95% of voltage hangs can be reimbursed by mixing a voltage of up to 60% of the prominent voltage, with a biggest level of 30 cycle. Thusly, in light of the islanding zone central and hang/swell/barge in with pay, islanding is seen and a flag  $\mu$ G-I, as showed up in Fig.4(b), is what's continuously made in the proposed UPQC $\mu$ G-IR to trade it to the DG converters. As the APFse expect the hazard for reimbursing voltage hang/swell/unbalance disturbances (depending on the controller), IsD estimation in the proposed UPQC $\mu$ G-IR can be moment yet extraordinarily flexible. Clearly, it will lessen the multifaceted idea of islanding zone methodology or even can be removed from all the DG converters in a  $\mu$ G system. Fse see the danger for reimbursing voltage hang/swell/unbalance irritating impacts (subordinate upon the controller), IsD figuring in the proposed UPQC $\mu$ G-IR can be fundamental yet completely adaptable. Clearly, it will reduce the multifaceted idea of islanding region framework or even can be removed from all the DG converters in a  $\mu$ G structure.

Fig.5 demonstrates a sensible count (with model) that has been used to see the islanding condition to work the UPQC in islanded mode. The voltage at PCC is taken as the reference and it is always in stage with the source and the DG converters, the refinement between the  $V_{pcc-ref}$  (pu) and  $V_s$  (pu) is  $V_{error}$ . This botch is by then isolated and the preset characteristics (0.1– 0.9) and a holding up period (customer depicted n cycles) is used to pick the hang/burst in/islanding condition. In this model: 1) if  $V_{error}$  isn't generally or proportionate to 0.6, by then 60% hang will be balanced for up to 50 cycles; 2) in case  $V_{error}$  is amidst 0.6 and 0.9, by then pay will be for 30 cycles; and 3) all around

(if  $V_{error} \geq 0.9$ ) it will be encroach with/dull out for islanding after 1 cycle.

This banner age system is fast and can be adjusted for at whatever point length and  $V_{error}$  condition. From this time forward, the learning can be made by having all the earmarks of being operational flexibility of time and control of hang/barge in with compensation before islanding. As the reliable voltage trade from structure related with kept mode is one of the principal errands pushing time task, the trade is done at the zero-get together point position of the APFse. In this manner, no voltage change or abrupt conditions occur.

It is to be seen that, this is the focal encountered the estimation and islanding structures are exhibited in the control some bit of the UPQC, which are speedy and flexible in errand. As appeared by Fig.1, the best control and movement of the switches are urgent for insightful islanding and unflinching reconnection. Everything considered, this paper exhibits a topology that keeps an eye out for a phase forward isolated and the usage of quick alliance administrators (ICA) as showed up, an additional module named ICA is connected with a current  $\mu$ G with different current sources. The ICA module goes about as voltage source to fix the voltage and repeat in islanding mode and can guarantee proceeding on alliance/bit of the  $\mu$ G from the central cross zone. The UPQC $\mu$ G-IR showed up in this paper isn't simply wanted to play out these strong changes, yet by improve the power quality with some operational versatility. Also, the UPQC having a reasoning portion (APFse) can play out the improvement of voltage wellspring of the  $\mu$ G, and successfully PCC voltage understanding based adversary of islanding figuring should be conceivable, as showed up in Fig.5. Notice that using standard apparatus, e.g., in grid related PV structures, the non-seeing accreditation zone (NDZ) increases with the degree of PV inverters, since they are not set up to see the outside cross areas or other PV inverters yield voltage, along these lines may remain related for a dangerously expanded time divide period. With the proposed UPQC control structure, we can go along with it in a current PV plant, and this unit will be the essential alone dependable of the voltage support and islanding conspicuous affirmation, beginning now and into the not so distant being astutely mind blowing and decreasing on a very basic level the NDZ.

## V. FUZZY LOGIC CONTROL

A soft control system is a control structure subject to cushioned reason—a numerical system that analyzes principal information regards with respect to sound factors that take on relentless characteristics some spot in the degree of 0 and 1, instead of standard or pushed legitimization, which handles discrete estimations of either 1 or 0 (certified or false, as it were).

Overview Cushy reason is normally used in machine control. The clarification "cushioned" prescribes the manner by which that the reason included can oversee contemplations that can't be presented as the "real" or "false" at any rate rather as "for the most part undeniable". In any case, elective hypotheses, for instance, genetic counts and neural frameworks can perform about relatively as agreeable help everything considered, cushioned technique for deduction has the ideal position that the response for the issue can be flung in wording that human executives can see, with the objective that their experience can be used in the strategy of the controller. This makes it dynamically clear to modernize errands that are starting at now adequately performed by individuals.

**History and applications**

Fluffy reason was first proposed by Lotfi A. Zadeh of the University of California at Berkeley in a 1965 paper.[3] He cleared up on his considerations in a 1973 paper that demonstrated the likelihood of "semantic parts", which in this article considers to a variable portrayed as a padded set.[4] Other research hunt down after, with the focal present day application, a security stove worked in Denmark, continuing with line in 1975.

Pleasing structures were at first executed in Japan.

- Interest in pleasing frameworks was started by Seiji Yasunobu and Soji Miyamoto of Hitachi, who in 1985 gave reenactments that demonstrated the probability of padded control structures for the Sendai Subway. Their examinations were gotten, and woolen structures were utilized to control vitalizing, braking, and halting when the Namboku Line opened in 1987.
- In 1987, Takeshi Yamakawa showed the use of padded control, through a gigantic proportion of key submitted woolen technique for reasoning chips, in a "changed pendulum" test. This is an astonishing control issue, in which a vehicle endeavors to keep a post mounted on its best by a turn upstanding by pushing ahead and in switch. Yamakawa thusly made the show always refined by mounting a wine glass containing water and even a live mouse to the most basic motivation driving the pendulum: the structure kept up soundness in the two cases. Yamakawa finally kept managing his own one of a kind extraordinary padded structures get a few information about lab to help misuse his licenses in the field.
- Japanese designs in this manner built up a wide dimension of delicate structures for both mechanical and client applications. In 1988 Japan built up the Laboratory for International Fuzzy Engineering (LIFE), a fantastic method between 48 relationship to examine for after warm research. The vehicle affiliation Volkswagen was the central remote corporate individual from LIFE, dispatching a controller for a term of three years.
- Japanese buyer stock reliably join delicate structures. Matsushita vacuum cleaners use microcontrollers running fluffy figurings to take a gander at buildup sensors and change suction control as necessities be. Hitachi bits of articles of clothing washers utilize padded controllers to stack weight, surface blend, and soil sensors and thusly set the wash cycle for the best use of power, water, and designed.

u	e						
	NB	NM	NS	Z	PS	PM	PB
Δe	PB	Z	PS	PM	PB	PB	PB
	PM	NS	Z	PS	PM	PB	PB
	PS	NM	NS	Z	PS	PM	PB
	Z	NB	NM	NS	Z	PS	PM
	NS	NB	NB	NM	NS	Z	PS
	NM	NB	NB	NM	NM	NS	Z
	NB	NB	NB	NB	NB	NM	NS

Table 1.The decision table of FLC.

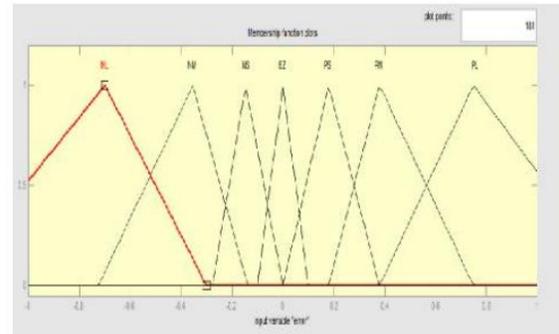


Fig.6. Membership functions of FLC

**A.PI Controller:**

The clarification behind an engine speed controller is to take a banner watching out for the referenced speed, and to drive an engine at that speed. Shut circle speed control structures have fiery reaction, notwithstanding wound up being costly because of the need of examination parts, for example, speed sensors. Speed controller learns the segment between the reference speed and the veritable speed abandoning on a disaster area, which is asked to the PI controller. PI controllers are utilized completely for improvement control structures. They intertwine a relative headway that makes a yield a yield showing up diversely in connection to the information mess up a mix to make the solid state ruin zero for a stage change in the data. PI controller is a standard control circle input isolate (controller) when all is said in done utilized in mechanical control structures – a PI is the most normally utilized examination controller and learns a "disaster area up" see as the segment between a mindful framework variable and an ideal set point. The controller endeavors to limit the mishandle by adjusting the process control inputs. The PI controller check (tally) wires two separate unfazed parameters, and is as necessities be every so often called two-term control: the relating, the central attributes, suggested P, I. Heuristically, these attributes can be implied the degree time: P relies upon the present abuse, I on the get-together of past oversights, in light of current rate of advancement.

The weighted whole of these three activities is utilized to modify the philosophy through a control isolate, for example, the situation of a control valve. There are a couple of frameworks for tuning a PI circle.

### B.Blend Fuzzy-PID Controller

Regardless of the way that it is conceivable to structure a feathery premise kind of PID controller by an immediate difference in the traditional ones, by strategies for embeddings some important cushioned reason IF-THEN standards into the control framework, these methodology when all is said in done muddle the general course of action and don't consider new fleecy PID controllers that get the principal attributes and nature of the standard PID controllers. Moreover, they by and large don't have exact conditions to use for control affirmation and unwavering quality examination. The fleecy PD, PI, and PI+D controllers to be presented underneath are ordinary improvements of their regular understandings, which secure the straight structures of the PID controllers, with immediate and standard intelligent conditions as the last inevitable results of the game plan. In this way, they can expressly uproot the standard PID controllers in any working control structures (plants, shapes).

The fundamental capability is that these cushioned PID controllers are orchestrated by utilizing cushy premise control models and systems, to get new controllers that have clever recipes on an exceptionally essential dimension proportional to the ordinary modernized PID controllers

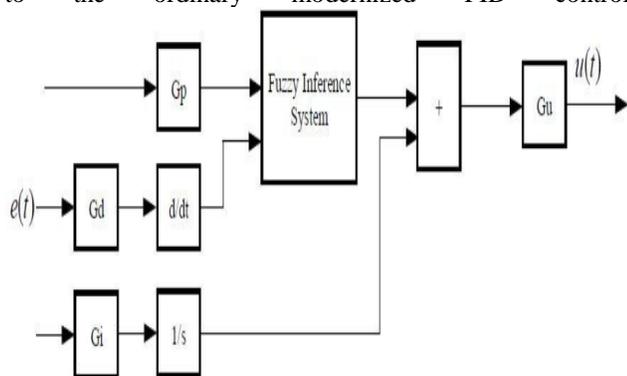


Figure.7. Hybrid Fuzzy PID Controller

### VI.MATLAB/SIMULATION RESULTS

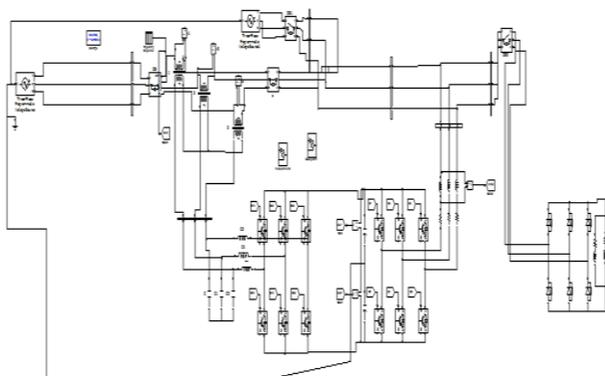


Fig.8 MATLAB/SIMULINK Circuit for the UPQCμG-IR



Fig.9 Error voltage, Switch 2 voltage, Switch 3 voltage and Islanding reconnection

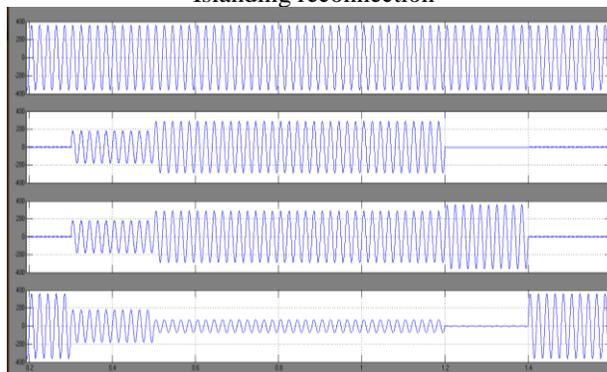


Fig.10 Point of Common Coupling (PCC) voltage, Sag Voltage, Reference sag voltage and supply voltage

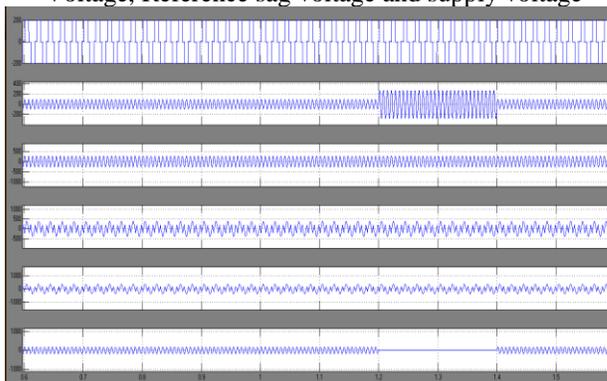


Fig.11 Load current, Distributed Generation current, Point of Common Coupling (PCC) current, Shunt current, Reference shunt current and Source current

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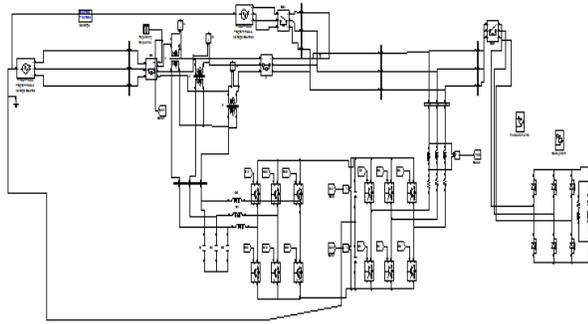


Fig.12 MATLAB/SIMULINK Circuit for the UPQC $\mu$ G-IR performance

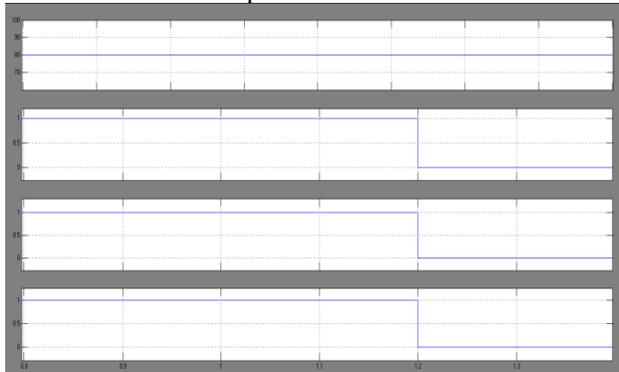


Fig.13 Error voltage, Switch 2 voltage, Switch 3 voltage and Islanding reconnection

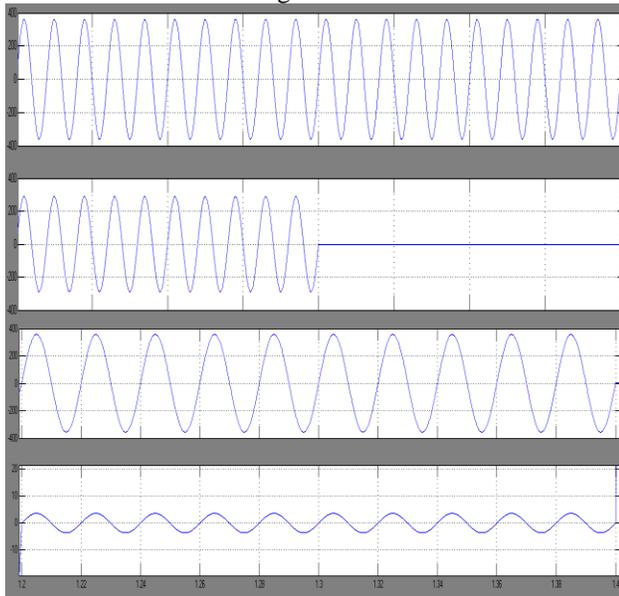


Fig.14 Point of Common Coupling (PCC) voltage, Sag Voltage, Reference sag voltage and supply voltage

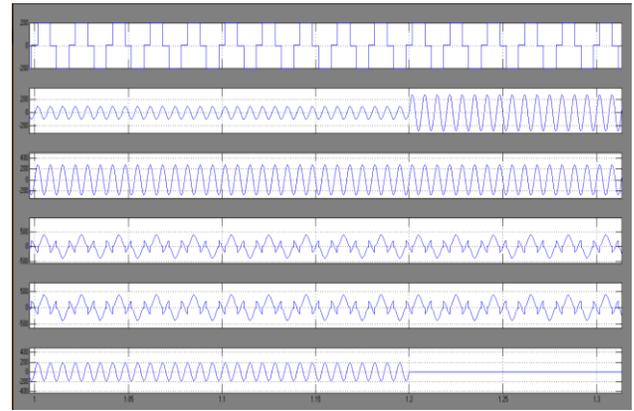


Fig.15 Load current, Distributed Generation current, Point of Common Coupling (PCC) current, Shunt current, Reference shunt current and Source current

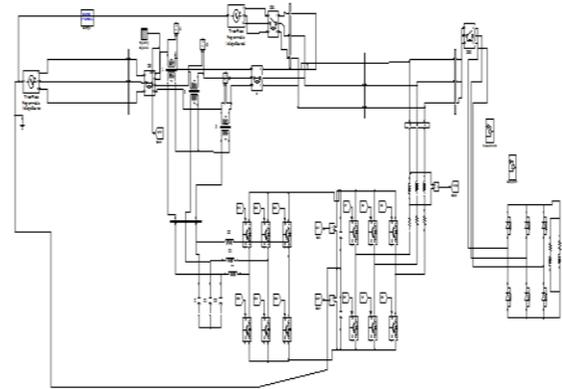


Fig.16 MATLAB/SIMULINK Circuit for the UPQC $\mu$ G-IR reconnection



Fig.17 Error voltage, Switch 2 voltage, Switch 3 voltage and Islanding reconnection

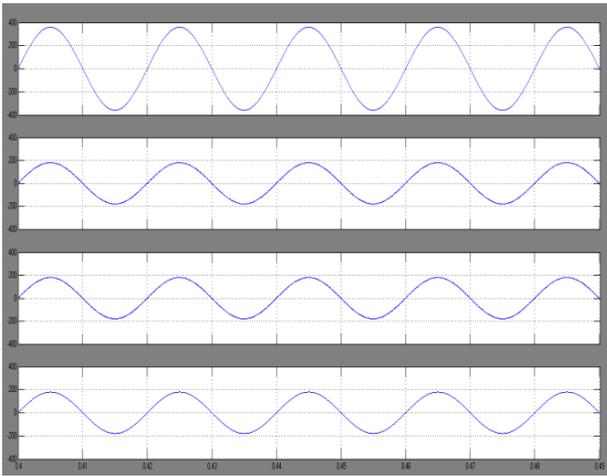


Fig.18 Point of Common Coupling (PCC) voltage, Sag Voltage, Reference sag voltage and supply voltage

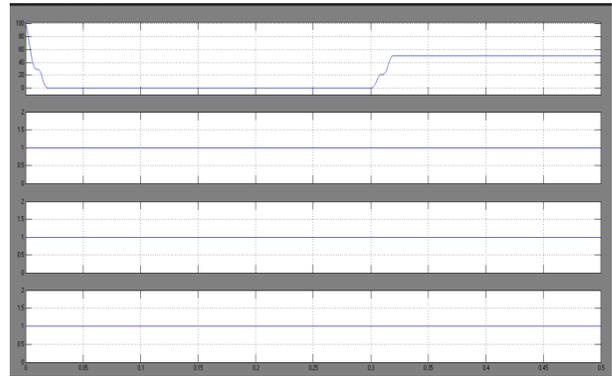


Fig.21 Error voltage, Switch 2 voltage, Switch 3 voltage and Islanding reconnection

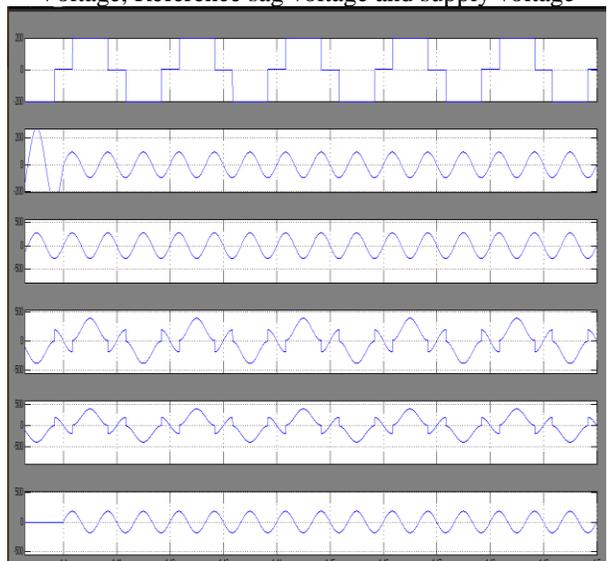


Fig.19 Load current, Distributed Generation current, Point of Common Coupling (PCC) current, Shunt current, Reference shunt current and Source current

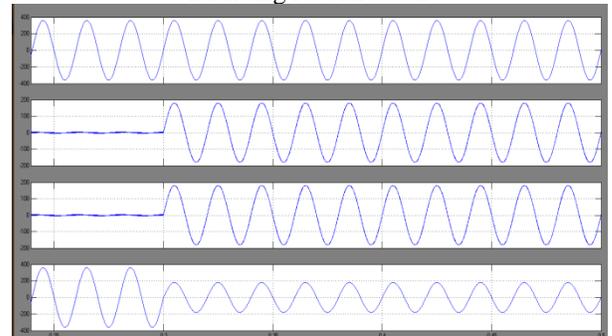


Fig.22 Point of Common Coupling (PCC) voltage, Sag Voltage, Reference sag voltage and supply voltage

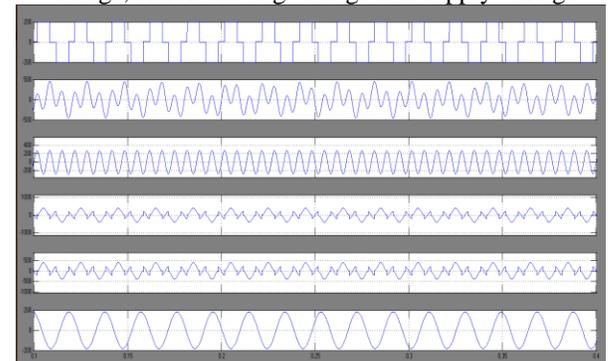


Fig.23 Load current, Distributed Generation current, Point of Common Coupling (PCC) current, Shunt current, Reference shunt current and Source current

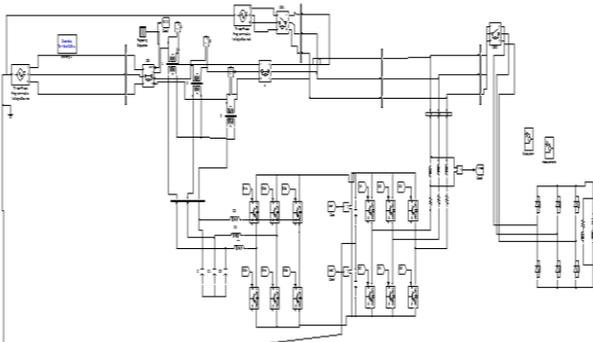


Fig.20 MATLAB/SIMULINK Circuit for the UPQCμG-IR with PI controller

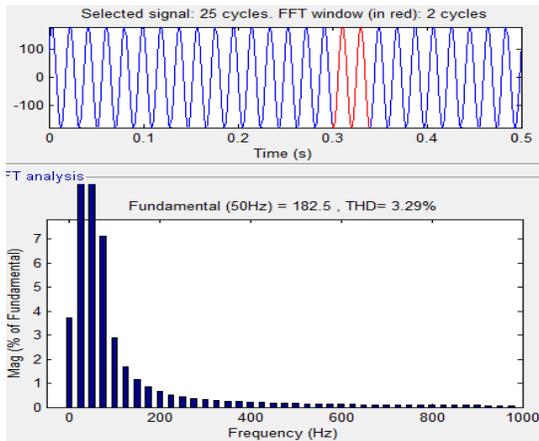


Fig.24 Source current THD

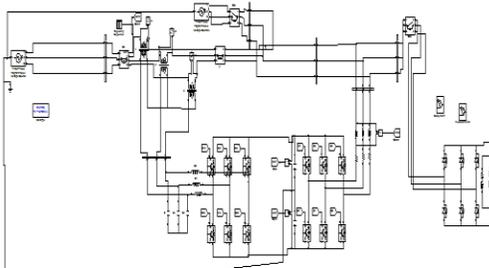


Fig.25 MATLAB/SIMULINK Circuit for the UPQCμG-IR with FUZZY Logic controller

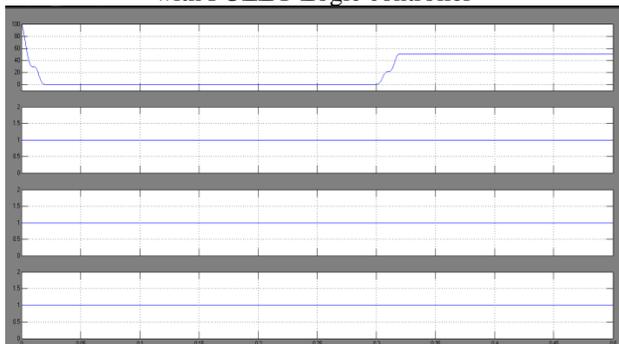


Fig.26 Error voltage, Switch 2 voltage, Switch 3 voltage and Islanding reconnection

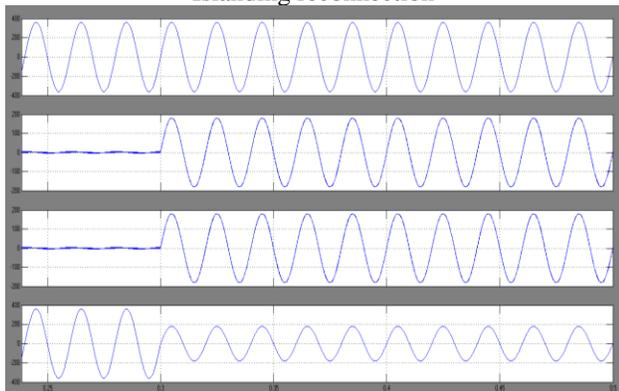


Fig.27 Point of Common Coupling (PCC) voltage, Sag Voltage, Reference sag voltage and supply voltage

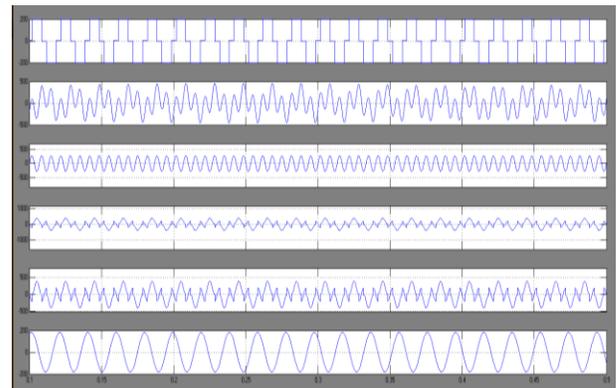


Fig.28 Load current, Distributed Generation current, Point of Common Coupling (PCC) current, Shunt current, Reference shunt current and Source current

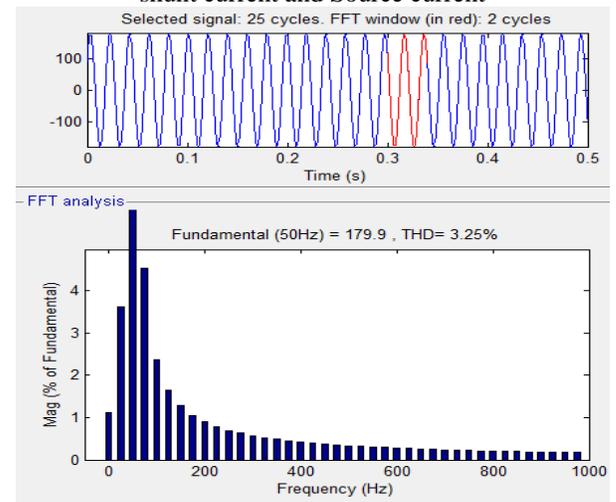


Fig.29 Source current THD

## VII. CONCLUSION

This paper has enough executed the microgrid based bound together power quality conditioner close-by the delicate reason controller. For the most part, the microgrid thought basically revolves around the decreasing of power quality issues related with the structure, the later are compensated by bound together power quality controller. The fluffy strategy for thinking controller is utilized for showing up of advancement execution by the decrease of firm symphonious reshaping in the structure. The age results are gotten for the Grid interfacing utilizing approach and parallel converter structure with regular PI controller and Fuzzy premise controller. Because of the nearness of non-linearity in the framework, sounds are passed on which lead to voltage mutilations.

