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POWER LOSS MINIMIZATION IN RADIAL DISTRIBUTION SYSTEM

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Abstract – *The proposed method alluded to as fuzzy logic controller. An IEEE bus system made and the dissemination system utilized here is PV sunlight based. The primary point of our proposed work is to lessen the power misfortune and the entire system actualized in MATLAB Programming. The fuzzy procedure has been connected for taking care of the issue of ideal DG situation in IEEE 33-Bus and 69-Bus distribution systems. With the end goal of burden stream, an outstanding direct burden stream strategy been utilized. After the investigation of the outcomes got for the two test systems, it tends to be reasoned that fuzzy is a powerful methodology for limiting the conveyance organize misfortunes and improving the system voltage profile. Therefore, an improved repeatability of results just as lower by and large computational intricacy of the enhancement procedure has been accomplished. The best arrangement of intensity misfortune decrease and VSI improvement of both 33-and 69-bus systems was accomplished when the system reconfiguration with ideal measuring and the area DG were at the same time implemented. The influence misfortune minimization in conveyance systems for the most part known as a fundamental accomplishment in influence system activities. In the meantime, a fast development in burden request as a rule brings more voltage precariousness into the system. DG position in IEEE 33-and 69-bus dissemination systems with the target capacities including power misfortune minimization and VSI improvement. Power stream is a helpful apparatus in activity, arranging and enhancement of a system. Distribution systems, for the most part, alludes to the power system associated with burdens at lower working voltage*.

Key Words: IEEE33&69 bus system, DG, FLC,POWER LOSS.,

1. INTRODUCTION

The grid that advances develop and send, the hole for creating efficient operations strategies made [1]. In electric power distribution systems, it is alluring to exploit computational insight and robotization given by the Smart Grid innovations, which in a brought together style make an efficient, reliable, clean, secure, and manageable electric power supply [2]. A portion of the burdens in distribution systems are system over-burdening at various times of the day and burden limit increment; these bothers cause unnecessary power misfortunes and voltage levels varieties past standard operational dimensions, subsequently bringing down influence quality or even interfere with the influence supply. Decrease the losses of power and improvement for profiles voltage in power distribution systems has been frequently drawn closer by methodologies for example, distribution network, capacitor bank position and Volt/VAR control [3], [4]. As of late, ideal portion of distributed generation (DG) has been mulled over as a technique for network support because of its attributions towards recurrence drop adjustment [5], loss in power reduction and voltage profile improvement [6]–[13]. Blend of different strategies, for example, conveyance reconfiguration and ideal portion of DGs have been proposed to expand the advantages; in any case, the viable unpredictability of actualizing. A few procedures is connected joining in distribution system, for example, logical, mathematical strategies and heuristics techniques. The Distribution generation situation issue is a complex issue having non-straight objective(s) just as nonlinear requirements. In a blended whole number nonlinear streamlining strategy been utilized to decide the ideal positions and limits of DG units to be set in an distribution system.

1.1 DISTRIBUTION NETWORK

Distribution arranges regularly portrayed by their spiral structure, intended to convey electric power from the substation to all the current burdens interconnected to the system. Fig.1.3.1 demonstrates a solitary line chart of a 16-bus spiral distribution arrange. In view of the outspread topology of the distribution organize, the feeder bus must probably withstand the summation of burden request at the consequent nodes and the power misfortunes in the line fragments. In exacting terms, as spoken to by Eq(1.) the stacking of the feeder bus can be portrayed as pursues:

$$PF = X\ N\ n=1\ P_n + P_{loss} \quad (1)$$

Where PF is the power fed to the network by the feeder bus, N is the number of nodes, P_n is the load power demand at bus n and P_{loss} are the power losses in the

lines. During distribution system analysis, it is common practice to consider the feeder bus as the source node, and loads, generator or other components are assumed to be connected at the subsequent nodes.

1.2 POWER LOSS

The vast majority of the power misfortunes present in influence systems are because of resistive misfortunes (I2R) given in the electrical cables, in spite of the fact that misfortunes given in other hardware (for example transformers) can be extensive [25]. Power misfortunes in distribution systems can represent up to 70 present of the all-out influence misfortunes [26], thusly, service organizations regularly scan for answers for limit operational costs identified with electric influence conveyance and influence misfortunes are no special case. Improvements of Keen system innovation and appropriated age speak to an impetus for power architects to create philosophies connected to the decrease of intensity misfortunes, which legitimately limit operational expenses of influence conveyance.

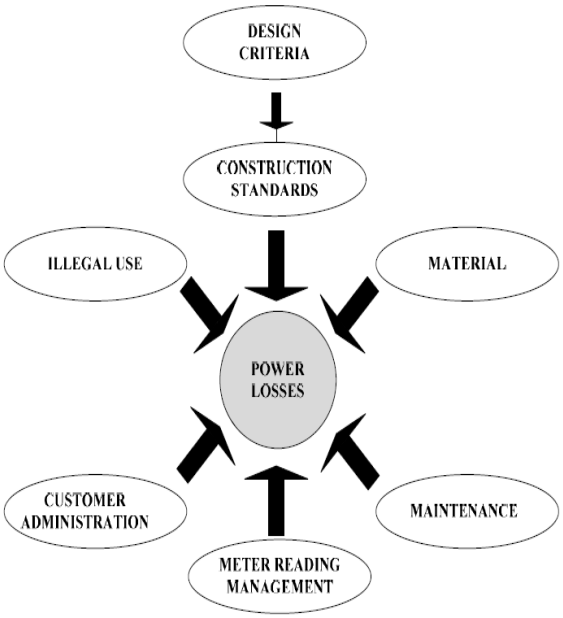


Fig-1:- Overview factors of Distribution Loss

2. RELATED WORK

The existing work thinks about Incorporation of disseminated age (DG) in a circulation arrange is a key for power misfortune relief and improvement in the voltage profile. In this paper, a blended whole number nonlinear programming (MINLP) based streamlining system has been utilized to decide the ideal sizes and comparing areas of DGs to be put in a circulation arrange for decrease of intensity misfortune and improvement in the voltage profile. The MINLP method considered in this paper, uses the consecutive quadratic programming (SQP) through 'fmincon' work accessible in the MATLAB improvement tool compartment. The MINLP procedure has been connected for tackling the issue of ideal DG situation in IEEE 33-Transport and 69-Transport dispersion systems. With the end goal of burden stream, an outstanding direct burden stream system has been utilized. After the investigation of the outcomes got for the two test systems, it can presumed that MINLP is a successful methodology for limiting the circulation arrange misfortunes and improving the system voltage profile by ideally putting the DGs of reasonable sizes at proper areas. In [2], another work depends on decrease of dynamic (or genuine) control misfortunes through PSO and SPSO streamlining procedures. SPSO is propelled variant of PSO which gives far superior outcomes when contrasted with PSO and presents ideal answer for our concern. Arrangement of DGs in conveyed organize must be ideal else it will create more power misfortunes instead of diminishing it. The creators have utilized harmonious creatures look (SOS) calculation with the goal to diminish dynamic power misfortune just for example control misfortunes relating to the genuine segment of the current by ideal estimating of DGs.

3. RESEARCH METHODOLOGY

In particular, straightforward approaches can be computationally expensive or even prohibitive whereas heuristic or meta-heuristic approaches can yield acceptable results with less computation cost. In this thesis work tweaked developmental calculation has been acquainted and applied with power appropriation organization. The recombination administrators of the calculation are intended to safeguard attainability of arrangements here, the spiral design of the organization consequently extensively decreasing the size of the pursuit space. Therefore, an improved repeatability of results just as lower in general computational intricacy of the enhancement cycle has been accomplished. The proposed strategy is alluded to as fluffy rationale regulator.An IEEE 33 and 69 bus system is created and the distribution system used here is PV solar. The main aim of our proposed work is to reduce the power loss and the whole system is implemented in MATLAB SOFTWARE.

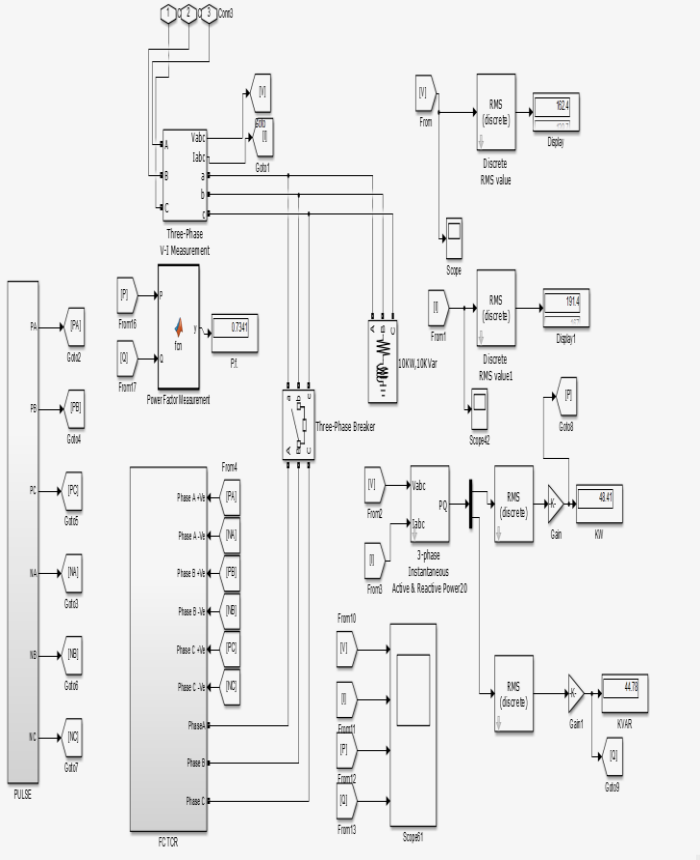


Fig -2:- Matlab Simulink Diagram

3.1 FLC

Fuzzy logic controller takes the contribution from estimating component. It take dynamic force and from that it's create load voltage by utilizing on the off chance that standard and that yield is contrasted and reference voltage and it will produce blunder. With regards to the intricacy of voltage and receptive force control, fuzzy rationale control hypothesis considered to apply in the control. Fuzzy control is another control technique dependent on fuzzy math, which qualifies the variable through fuzzy set hypothesis, communicates individuals' involvement with fuzzy contingent proclamation and produces control system utilizing fuzzy thinking. MATLAB's Fuzzy Rationale Tool stash and Sim-power framework are utilized to reenact and plan the Fuzzy rationale based voltage control hand-off.

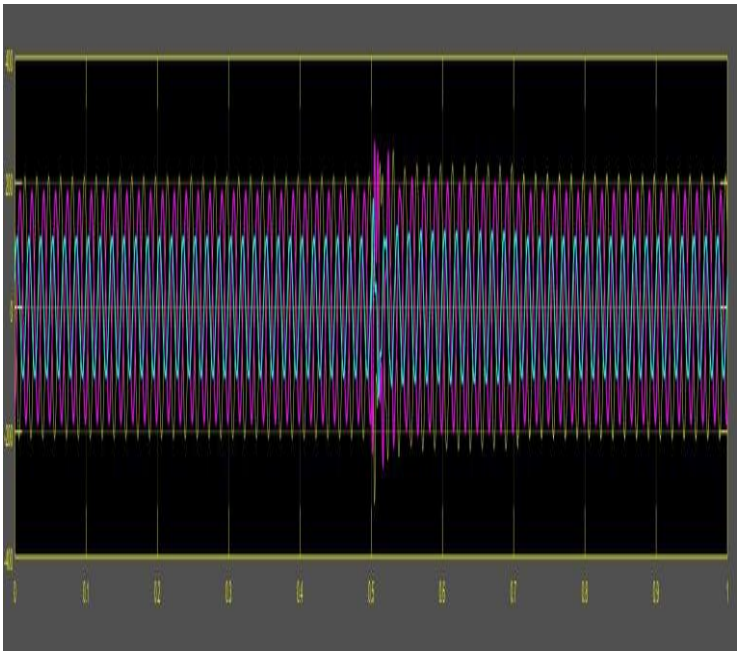
Fuzzy control is another control technique dependent on fluffy science, which qualifies the variable through fluffy set hypothesis, communicates individuals' involvement in fluffy contingent proclamation and creates control procedure utilizing fluffy. A Fluffy Rationale Controller (FLC) is a sort of a state variable controller represented by a group of standards and a fluffy induction instrument. The FLC calculation can be executed utilizing heuristic systems, characterized by etymologically depicted articulations. The fluffy rationale control calculation mirrors the instrument of control actualized by individuals, without utilizing any formalized information about the controlled article as numerical models, and without a logical portrayal of the control calculation. The primary FLC forms are fuzzification, rules definition, derivation instrument and defuzzification. Fuzzification is the way toward exchanging the fresh info factors to relating fluffy factors thinking.

4. RESULTS AND DISCUSSIONS

4.1 IEEE 33 BUS SYSTEM

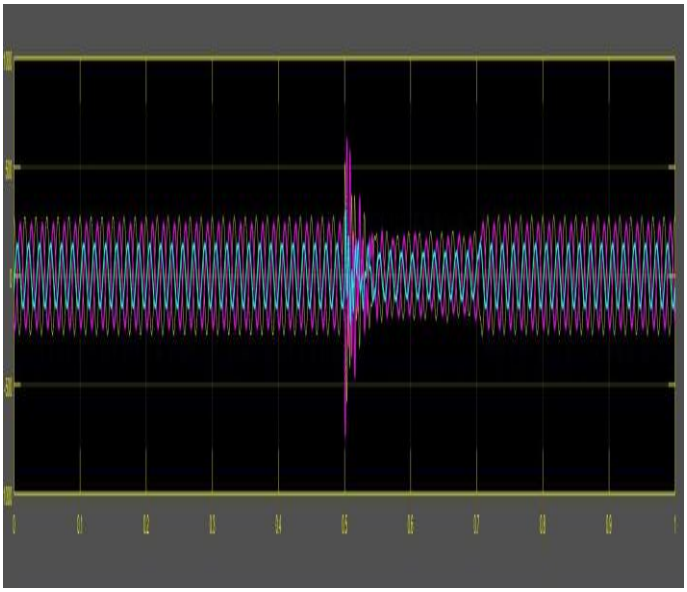
On double click on the scope following graphs will be displayed as voltage , current, real power and reactive power

Voltage graph: This graph represents the voltage of IEEE 33 bus system with respect to time. From 0 to 0.5 voltage remains constant after at the time interval of 0.5 distortion occur due to solar panel is introduced



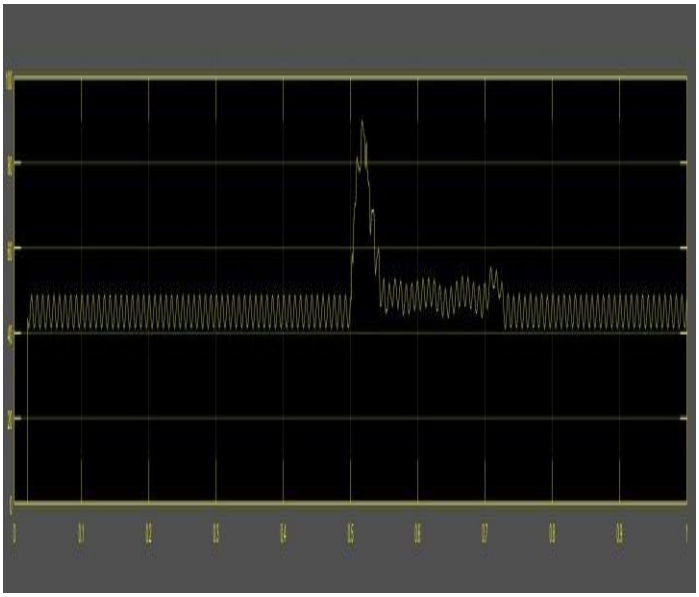
Graph-1: Voltage vs. Time

Current graph: This represents the current values of IEEE 33 bus system with respect to time. At time interval of 0.5 distortions occurs due to solar panel.



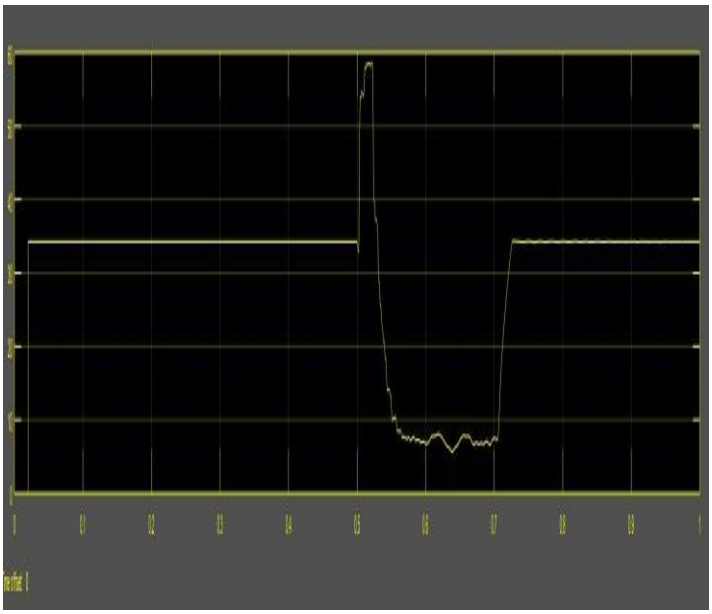
Graph-2: Current vs Time

Active Power: This graph represents the Active power of IEEE 33 Bus system. During time interval of 0 to 0.5 the active power remains constant 40 kw. At 0.5 due to addition of solar panel value abruptly changes from 40 KW to 85 KW and decreases to 42 KW during time interval of 0.5 to 0.7 and then again remains constant to 40kw.



Graph-3: Active Power

Reactive Power: This represents the Reactive power of IEEE 33 bus system. From the graph value remains constant 35 KVAR. Due to solar panel addition values change to 58 KVAR at time interval of 0.5 and then suddenly decreases to 9 KVAR during time interval of 0.55 to 0.7 and then again remains constant to 35 KVAR.



Graph-4: Reactive Power

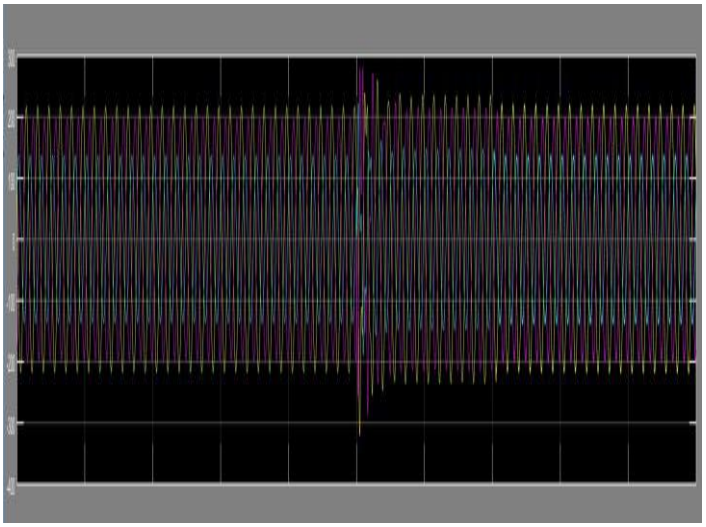
Table 1: calculation of power loss of 33 bus system

S.NO	ACTIVE POWER (KW)	REACTIVE POWER (KVAR)	POWER LOSS(KW)
1	42.97	34.25	10.88
2	48.42	34.25	11.52
3	48.39	33.182	10.28
4	86.93	58.48	18.09

4.2 IEEE 69 BUS SYSTEM

IEEE 69 BUS SYSTEMS

Voltage Graph: This graph represents the voltage of IEEE 69 bus system with respect to time. From 0 to 0.5 voltage remains constant after at the time interval of 0.5 distortion occur due to solar panel is introduced.

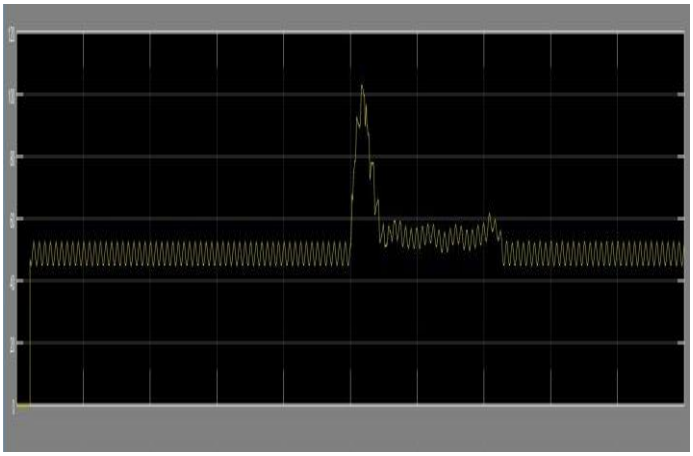


Graph-5:- Voltage vs Time

Current Graph: This represents the current values of IEEE 69 bus system with respect to time. At time interval of 0.5 distortions occurs due to solar panel.

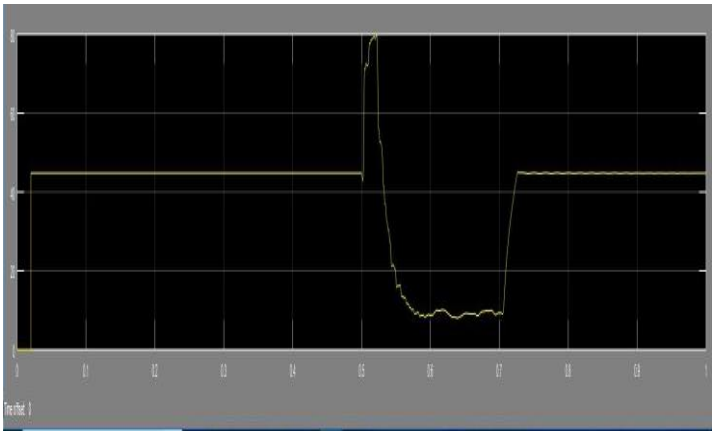
Graph-6: Current vs Time

Active Power: This graph represents the Active power of IEEE 69 Bus system. During time interval of 0 to 0.5, the active power remains constant 50 kw. At 0.5 due to addition of solar panel value abruptly changes from 50 KW to 102 KW and decreases to 58 KW during time interval of 0.5 to 0.7 and then again remains constant to 50kw



Graph-7: Active power

Reactive Power: This represents the Reactive power of IEEE 69 bus system. From the graph value remains constant 45 KVAR . Due to solar panel addition values change to 80 KVAR at time interval of 0.5 and then suddenly decreases to 9 KVAR during time interval of 0.55 to 0.7 and then again remains constant to 45 KVAR.



Graph-8: Reactive Power

Table 2: Calculation of power loss of 69 bus system

S.NO	ACTIVE POWER (KW)	REACTIVE POWER (KVAR)	POWER LOSS(KW)
1	47.31	44.78	17.831
2	45.18	44.78	18.43
3	47.06	44.78	17.9
4	45.56	44.78	18.32

5. CONCLUSIONS

In this work, fuzzy logic algorithm preserving radial configuration of the network has proposed to solve the distribution network reconfiguration issue with regards to control misfortune decrease and voltage profile improvement. The result obtained from our proposed work of 33 bus systemis 50.77 KW at different four readings. So the total power saving is 75.938% and The result obtained from our proposed work is 72.481 KW at different four readings . So the total total power saving is 67.743%.

The Fuzzy algorithm is applied on IEEE 33-Bus and IEEE 69-Bus outspread conveyance organizations. Aftereffects of the two test frameworks approve the adequacy of the fuzzy rationale approach. The strategy depended on limiting force misfortunes and improving voltage quality to upgrade dissemination framework execution. The philosophy was tried on a norm of 33-bus outspread appropriation network test framework and a down to earth 69-bus spiral conveyance arrangement of locale. In light of the mathematical outcomes, it was shown that the calculation is viable in improving the productivity of the two test appropriation frameworks.

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