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Study of Power Loss in Three Phase Radial Distribution System

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ABSTRACT:

Seventy five percent of total global energy demand is supplied by the burning of fossil fuels. But increasing air pollution, global warming concerns, diminishing fossil fuels and their increasing cost have made it necessary to look towards renewable sources as a future energy solution.

In this paper review about Power Loss, Load flow analyses in radial distribution system. Study about enhancing voltage profile and decreasing power losses in electrical systems is must be solved in an optimal way due to load flow analysis in single phase and three phase radial distribution system. To improve voltage profile & stability of existing power system, FACTS devices and load flow analysis are the alternative solution. Different IEEE radial distribution system structure, difference between radial and ring main system and radial distribution system is shown better as compared to other distribution system.It describes active power loss, reactive power loss and voltage profile of radial distribution system as well as study about renewable energy source like distributed generation.

Keywords: Active Power Loss, Radial Distribution system, VAR loss, Distributed Generation

I. INTRODUCTION:

Power distribution systems have different characteristics from transmission systems. They are characterized as Radial meshed structures; Unbalanced networks/loads [1]. A distribution system originates at a substation where the electric power is converted from the high voltage transmission system to a lower voltage for delivery to the customers [2]. Fast Decoupled Load Flow method may provide inaccurate results and may not be converged. Therefore, conventional load flow methods cannot be directly applied to distribution systems [4].

II. LITERATURE SURVEY:

Bjhguyg Mukhtiar Singh, Rajiv K. Varma *et.al [1]* discuss about Renewable energy resources

are being increasingly connected in distribution systems utilizing power electronic converters. A novel control strategy for achieving maximum benefits from these grid-interfacing inverters installed in 3-phase 4-wire distribution systems. Inverter is controlled to perform as a multi-function device by incorporating active power filter. Grid-interfacing inverter combination and the 3-phase 4-wire linear/non-linear unbalanced load at point of common coupling appears as balanced linear load to the grid. It has been shown that inverter can be effectively utilized for power conditioning without affecting normal operation of real power transfer. As per review grid side currents are always maintained as balanced and sinusoidal at unity power factor. Benjamin Kroposki, Pankaj K. Sen *et al* explaining about distributed energy systems in industry and its technological advancement. Advanced power electronic interfaces will allow distributed energy systems to provide increased functionality through improved power quality and reactive power support. In this review there is also discussion of power electronics applications and distributed energy systems. J.A. Pec, J. Mutale P. *et al* distributed generation play a vital role for new era in electrical power generation This paper presents an issues concerning the integration of distributed generation into electric power systems especially of the renewable type. The fit and forget policy of connecting DG to electric power systems to a new more appropriate policy of integrating. DG into power system planning and operation though active management of distribution networks some of the opportunities that could be exploited in support of the integration and hence greater penetration of DG into electric power systems are also explored. Tripathy et al. [4] presented a Newton like method for solving ill-conditioned power systems. Their method showed voltage convergence but could not be efficiently used for optimal power flow calculations.

Sr. No.	Author's Name	Method/Technique	Work Done	Outcome
1.	Puthireddy Umapathi Reddy et.al	forward/backward sweep	MATLAB Programming LFS 19-Bus Unbalance system	Determine active power loss, active power, reactive power demand
2.	K.JITHENDRA GOWD et. al	Load Flow Solution	13-Node Unbalance	Optimum location for reactive power

			Distribution Networks	compensation
3.	J.A. Pec¸as Lopes et. Al	fit and forget approach	Distributed Generation Allocation	Operation and expansion of Distributed generation
4.	S. K. Khadam	Custom Power Devices	Concept of Power Park	Enhancing integration of RE and Power Quality
5.	R. V. Bhadani	Newton Raphson method, CPF	maximum loading and voltage stability margin	DG Allocation,Improvement of voltage profile, Loss reduction

III. OBJECTIVE :

The objective is to presents a technique for steady state power flow control and to overcome with major problem of voltage instability, voltage collapse & black out in radial distribution system. Mathematical modeling of three phase radial distribution system as well as distributed generation. Literature survey clear that voltage stability problem has been observed from radial distribution system, so Load Flow Analysis, Radial Distribution System, Forward Backward Sweep method and local search optimization are studies. Active power flow, reactive power flow, active power loss, reactive power loss in three phases radial distribution system is also study to reduce power loss by applying distributed generation in some buses of radial distribution system.

IV. RADIAL DISTRIBUTION SYSTEM

There are study and analysis of different structure of IEEE bus system. Here we are considering IEEE-14 bus system (a), IEEE-33 bus system (b), IEEE-69 bus system(c) IEEE-33 bus system (d) and IEEE-123 bus system. So IEEE-33 bus radial distribution system is using for load flow analysis as well as determination of voltage and current profile when distributed generation is applied to IEEE-33 bus system. Algorithm of Load flow analysis of Radial Distribution system in shown in below figure and comparison between radial distribution system and ring main system.

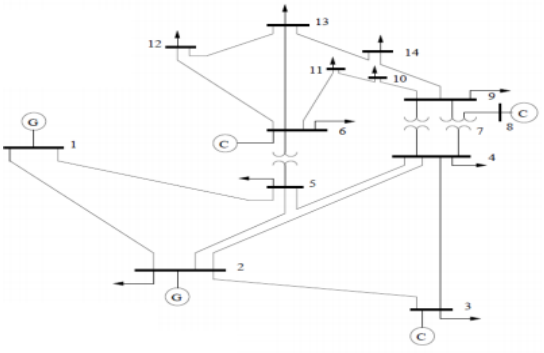


Figure (a): IEEE-14 bus System

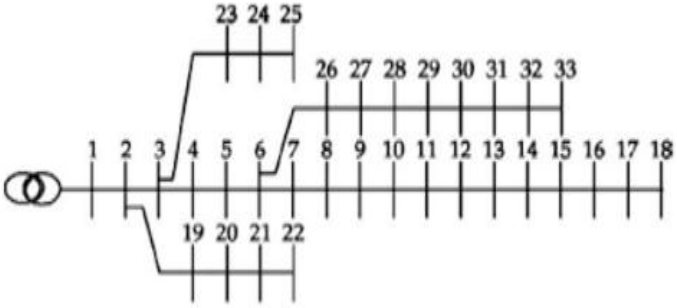
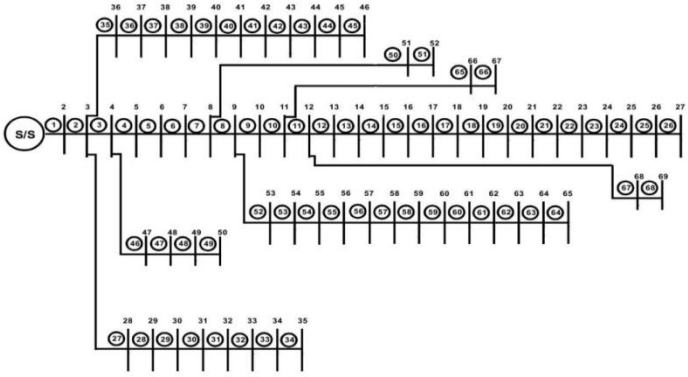


Figure (b): IEEE-33 bus System



igure (c): IEEE-69 bus System

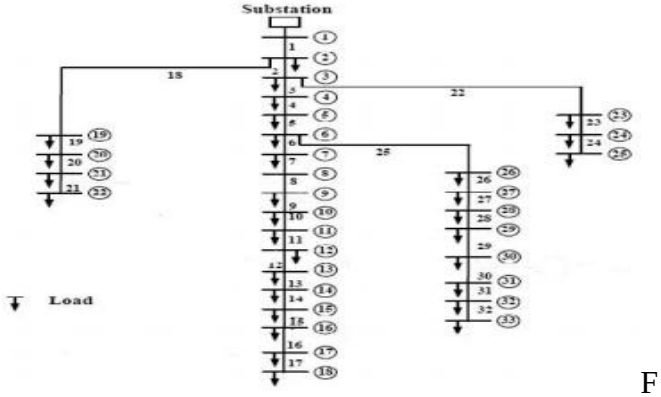


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Figure (d): IEEE-33 bus System

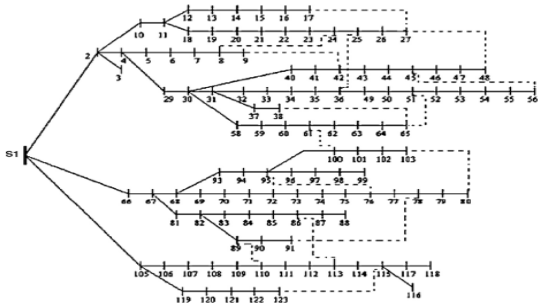

Figure (e): IEEE-123 bus System

Algorithm of Load Flow Analysis:

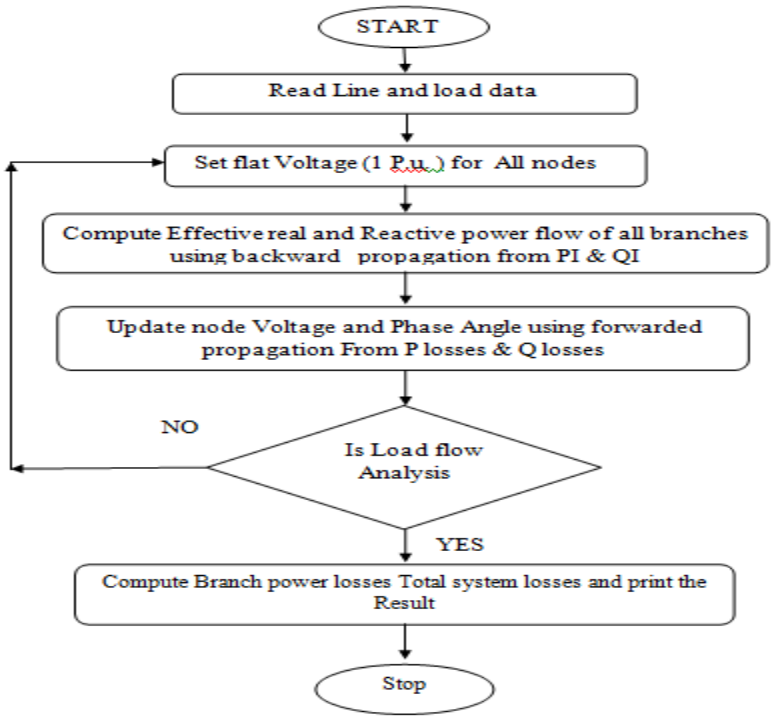

Table: 2 Differences between Radial Distribution System and Ring Main System

Sr. No.	Radial Distribution System	Ring Main System
1.	RDS has a low maintenance	RMS has High maintenance
2.	RDS is very economical and requires less materials	RMS is very expensive and requires more materials
3.	RDS initial cost is low	RMS initial cost is high
4.	RDS is Preferred when station is located at the center of load	RMS is not usable when client is located at center of load

V. CONCLUSION:

In Literature survey there are number of methods had been used for power/load-flow analysis of radial distribution system. As study about load flow analysis of radial distributed system following points were analyzed:

Radial distribution system should support electrical energy supply at minimum initial operation and maintenance cost.

It must satisfy continuous changing of load demand for active and reactive power.

Electricity is not easily stored and so, adequate spinning reserve of active and reactive power should be maintained and controlled in an appropriate manner.

To maintain quality of service offered regulated voltage well maintained constant frequency level of reliability and security that guarantees consumers satisfaction in radial distribution system.

To reducing active power loss and reactive power loss of radial distribution system is also possible by using distributed generation as current scenario.

Power demand of consumers can also fulfill with the help of distributed generation in radial distributed generation.

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