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Study of Load Flow Analysis in DG by Computational Method

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ABSTRACT: power flow study is based on active and reactive power of power system. power flow analysis is used for distribution network for planning and operational purpose. There are some methods which used to analyse the load flow and some of them are more efficient to give accurate result. A bus system used to analyse the performance of network. Some optimization techniques are involving to simulate the system like particle swarm optimization, load flow techniques, newton-Raphson method, genetic algorithm. This paper deals with the study of load flow techniques in distribution system.

KEYWORDS: Load Flow, Distributed Generation, Analysis, Power System

I. INTRODUCTION

Load flow analysis is the main criteria behind establishing and designing a power system. it is essential for planning, operation, economics scheduling and exchange of power between utilities. Main motive of power system analysis is to find the magnitude and phase angle of voltage at each bus and the real and reactive power flowing in each transmission lines [1]. Power flow analysis is an efficient mean that uses numerical analysis technique for developing a power system. To carry out these analyses, iterative techniques are used due to lack of any known analytical method to solve the problems [2,3]. Load floe studies must forcibly ensure that electrical power transfer from generators to consumers through the grid system is stable, reliable and economics. Newton-Raphson or the Gauss-Seidel methods are the most conventional tools to solve load flow problems. Load flow analysis is forming an essential prerequisite for power system studies.

II. NEED OF LOAD FLOW STUDY

Load flow studies play an important role basically in transmission networks which includes bulk power transmission and sub-transmission systems. Load at the buses is assumed to be known to carry out load flow calculations [7]. Using load flow studies some of the important operational aspects of the system, like violation of voltage magnitudes at the buses, overloading of generators, stability margin reduction, indicated by power angle differences between busses linked by a line, effect of contingencies like line voltages, emergency shutdown of generators etc are dealt with.

Moreover, the economic operation and transient stability of power system can be assured using load flow studies [8]. So, it can be concluded that load floe studies play a vital role in power system studies and providing accurate load flow data. To carry out load flow studies all the parameters are converted to per unit system and then the whole network is represented in form of a single line diagram to simplify calculations.

III. TERMS USED IN POWER FLOW

In load flow studies, various parameters are used which completely describe a power system network. Table 1 shows the terms of power flow studies.

Table 1. Terms of power flow studies

Per unit system	Analysis of three phase balanced system can be done on single-phase equivalent bases with one neutral and one phase terminal

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Single line diagram	A power system network is essentially represented as single or one lone diagram so as to simplify the connections which leads to simplicity in calculation.
Power injection	Power injection is amount of power that is being injected or added in a line or bus either at its terminal or in line which is grounded.
Bus system	A bus is a node or a point at which multiple generators, transmission lines, distribution lines are interconnected.

IV. IMPORTANCE OF LOAD FLOW STUDIES

Load flow studies act as backbone of power system. These studies are performed in major areas of power system developed and operation because of some reasons. Necessary for planning, economic scheduling and control of an existing system as well as planning its futures expansion [9-11]. This is the future development of a system in which load floes are used to study the effect and feasibility of changed in network configuration such as the removal or additional of the lines, new generation units, or increased loads due to a growing consumer demand. Load flow is central to the stability analysis performed on the proposed system. system security is also determined and multiple load flow are performed evaluated contingencies.

The configuration of the network changes due to loss of generation units or transmission circuits or change in demand of consumer load [12]. Load flow studies are used to evaluate these changes and compensate for high or low buses voltages by the addition or removal of statics capacitors, the alternation of ratio of transformer or by changing the reactive power of synchronous condensers or generator units.

V. POWER FLOW SOLUTION

Power flow problem being the basic problem in today's electricity networks needs a careful investigation of various methods which are devised to carry out load flow studies. Therefore, it is fundamental duty of every power engineer to carry out load flow calculations very efficiently and accurately. To solve the power flow problems, basically a numerical algorithm is developed [13-14]. To solve the load flow problem a power flow program is generally prepared which is a computer-generated code that implements a power flow solution procedure to evaluate the load flow data.in power flow solution the voltage and angle at all buses is calculated. Form this information the real and reactive generation and load level at all buses and the real and reactive flow across all circuit can be computed [15]. Power flow program for tens of thousands of interconnected buses can be solved using these programs. The power flow problems are fundamentally a network analysis-based problem.

VI. COMPARISION OF TECHNIQUES

In case of load flow analysis, there are many techniques used for analysis of load flow. Purpose of this study is to identify the effect of losses, reactive power and power factor. Load flow analysis can be done through different techniques. MATLAB program is basically used to calculate the bus voltage and their phase angle. Based on results, a comparison is made for different methods of load flow study. Different conditions lead to different results and hence every method has advantages and disadvantages.

VII. CONCLUSION

Power flow problem deals with calculation of voltage magnitude at all buses, their respective phase angles, active and reactive power flows, generation and load demands, thus playing an important role in power system engineering. The network of buses, terminal and lines are known as network topology. In context with load flow, the word load is substituted for power because load is statical quantity and it is power that flows in a power system network. This paper gives overview of importance and some methods used in load flow study.

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