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Review of Forward & Backward Sweep Method for Load Flow Analysis of Radial Distribution System

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ABSTRACT: Due to sharp increase in power demand, voltage instability & line overloading has become challenging problems for power engineers. Voltage collapse, unexpected line & generator outages & blackouts are the major problems associated with voltage instability. Reactive power unbalancing is the major cause of voltage instability. So that the problem of enhancing the voltage profile and decreasing power losses in electrical systems is a task that must be solved in an optimal way. This type of problem is in single phase & three phases. Therefore to improve & enhance the voltage profile & stability of the existing power system, FACTS devices and load flow analysis are the alternative solution. This paper describes a forward backward sweep method based approach for load flow analysis in radial distribution system to improve voltage stability and to minimize the transmission line losses considering cost function for entire power system planning. The proposed approach will be tested on IEEE-33 bus system.

KEYWORDS: Load flow analysis, Radial distribution system.

I. INTRODUCTION

The traditional Newton Raphson method and its modifications, the Fast Decoupled Load Flow methods are widely used for their efficiency in transmission system analysis but these methods are quite less effective in the analysis of distribution systems i.e. the systems with low line X/R ratios. The effectiveness of the forward backward sweep method in the analysis of radial distribution systems has already been proven by comparing it to the traditional Gauss–Seidel method.

In some cases the classical Newton Raphson (NR) method in the radial distribution analysis can show difficulties related to slow convergence; for this reason specific methodologies have been developed for these kinds of electrical systems.

II. CLASSIFICATION & COMPARISION

Load Flow in Radial Distribution System	**Advantage**	**Disadvantage**
Newton Downhill	1. Not Depends on Initial Solution 2. Higher Convergence Rate	1. Order of convergence less than 2 2. If jacobian matrix is singular then it fails

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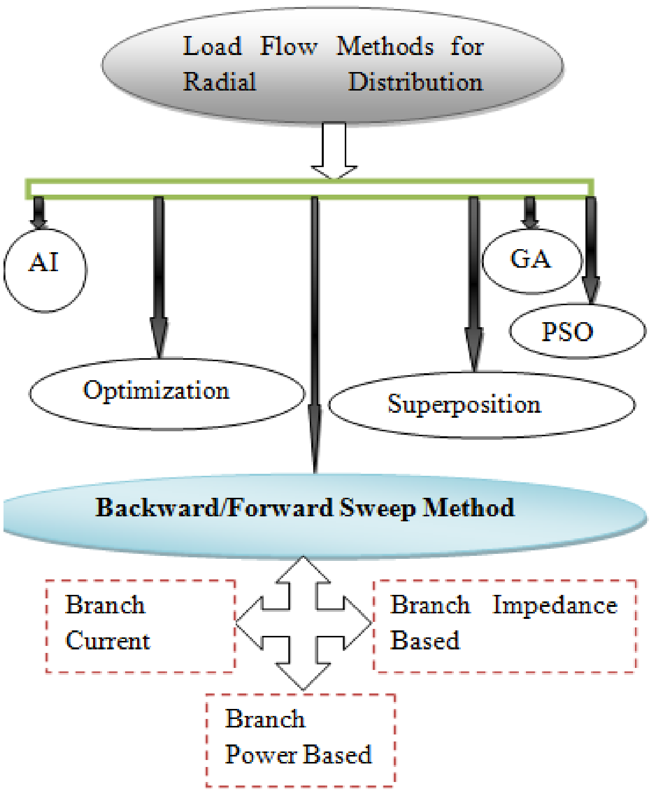
Genetic Algorithm Based	1. Simple to implement 2. Offline Problems suitable	1. In Complex network, excessive computation time needed 2. Sensitive to controller parameter
Particle Swarm Optimization (PSO)	1. Offline Problems suitable 2. Faster than GA	1. Slower Convergence 2. In complex network Unsuccessful
Artificial Neural Network	1. Suitable for On-line problems 2. Least Computation Time	1. Other methods Need 2. Specified Input Range Limited
Forward Backward Sweep Method	**1. Jacobian Matrix is Not Needed** **2. Not Depends on PV and DG Number for small Networks** **3. Suitable for online and offline Problems**	**1. Unsuccessful for Heavy Load** **2. Unsuccessful for large scale network**



III. FORWARD BACKWARD SWEEP METHOD:

Effective power flow in each branch is obtained in the backward sweep by considering rated voltage at the end node in first iteration, & the end node's voltage is equal to the voltage calculated in forward sweep in further iterations. This indicates that the backward sweep starts at the end node and proceeds towards the source node.

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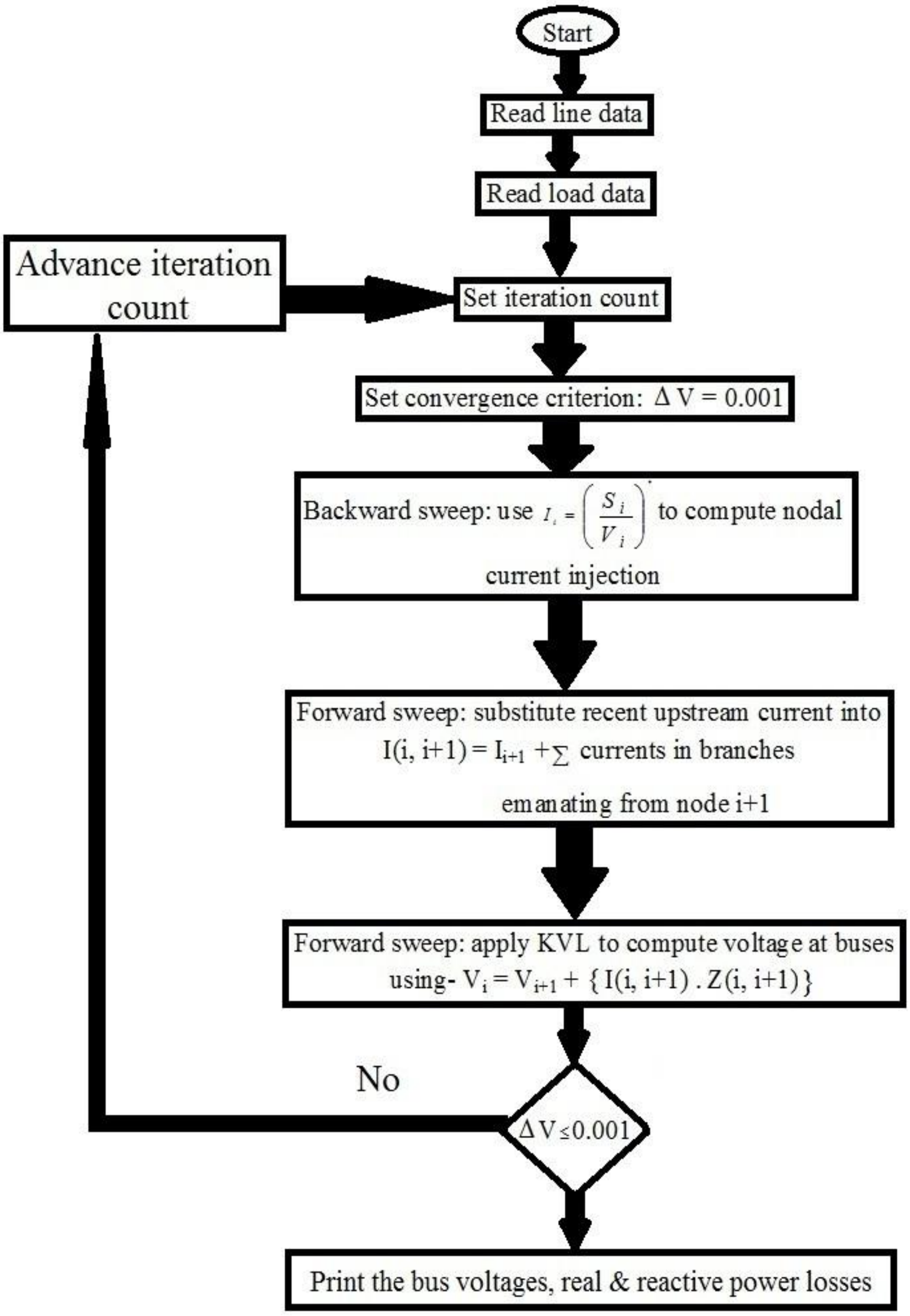
Voltage obtained at the source node calculated in backward sweep is used to check the convergence. If voltage obtained at the source node in backward sweep has less difference than the convergence criterion, then process stops there, & if the voltage is not in convergence limit, then forward sweep is started. The purpose of the forward sweep is to calculate the voltages at each node starting from the feeder source node. The feeder substation voltage is set at the value calculated in backward sweep. During forward sweep the effective power (i.e. the current calculated) in each branch is held same as the value obtained in backward sweep.

IV. ALGORITHM FOR FORWARD BACKWARD SWEEP METHOD:



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V. LITERATURE SURVEY

Author	Technology/Method	Objective
Yuntao Ju, Wenchuan Wu, Boming Zhang, Hongbin Sun	Sensitivity-Based Approaches	PV nodes refer to nodes connected by distributed generators with constant voltage control. Convergence remains satisfactory when the number of PV nodes increases for a wide range of branch X/R ratios
G. W. Chang, S. Y. Chu, H. L. Wang	Linear Proportional Principle	The mismatch of the calculated and the specified voltages at the substation is less than a convergence tolerance.

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BIOGRAPHY

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