e-ISSN: 2349-9745
p-ISSN: 2393-8161

Scientific Journal Impact Factor (SJIF): 1.711

International Journal of Modern Trends in Engineering and Research

www.ijmter.com

SIMULATION AND MODELLIMG OF SEVEN BUS SYSTEM WITH USING POWER WORLD SIMULATOR

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Abstract—In this paper, optimal power flow (OPF) is developed with using the Power world simulator. The Optimal power flow maintaining system security. System controls include generator megawatt outputs, transformer taps, and transformer phase shifts, while maintenance of system security ensures that no power system component's limits are violated. Special attention is paid to the heuristics important to creating an OPF which achieves solution in a rapid manner. In this paper only the load flow study is discussed. Some other applications of the OPF These include transmission line overload removal, transmission system control, available transfer capability calculation (ATC), real and reactive power pricing, transmission component valuation, and transmission system marginal pricing is also possible.

Keywords- Newton raphson method; Power world simulator; 7 bus system, OPF; Load flow analysis.

I.INTRODUCTION

Throughout the entire world, the electric power industry has undergone a considerable change in the past decade and will continue to do so for the next several decades. In the past the electric power industry has been either a government-controlled or a government-regulated industry which existed as a monopoly in its service region. All people, businesses, and industries were required to purchase their power from the local monopolistic power company. This was not only a legal requirement, but a physical engineering requirement as well. It just didn't appear feasible to duplicate the resources required to connect everyone to the power grid. Over the past decade, however, countries have begun to split up these monopolies in favour of the free market. Numerous papers and articles have been written on this topic with a good overview of the topic found in a series of articles written for IEEE Spectrum in July and August of 1996 [1 - 6]

. In the United States, the change from the regulated monopoly to the free market system has become known as restructuring. For the remainder of this paper, it will be referred to as restructuring.

One of the cornerstones of any restructuring plan is the ability to operate the transmission system in a manner which is fair to all participants in the industry. In the United States, the Federal Energy Regulatory Commission (FERC) oversees issues involving the transmission system. FERC presently believes that the only manner in which everyone will be on an equal playing field is to create open access to all. As stated in [7], "participants in wholesale power markets will have non-discriminatory open access to the transmission systems of public utilities."In order to achieve the ideal of open access, many outstanding engineering problems will need tobe investigated and tools created for their solution.

It is very important that these problems be addressed early in the restructuring process. If these engineering problems become overshadowed by short term economic concerns, then the result could be decreased electricity reliability. In the past year, the western United States has seen the consequences of pushing the transmission system too hard on two separate occasions. The two multistate blackouts in the Western States Coordinating Council (WSCC) system in the last several months may be destined to repeat themselves [8].

The work presented in this paper utilizes an optimal power flow program, OPF, as the tool for solving these problems. The OPF is a natural choice for addressing these concerns because it is basically an optimal control problem. The OPF utilizes all control variables to help minimize the costs of the power system operation. It also yields valuable economic information and insight into the power system. In these ways, the OPF very adeptly addresses both the control and economic problems. After creating the OPF program, the user-interface and simulation problems may also be addressed by implementing the OPF into a power system simulator. In this way, the results of the economic and control operations of the OPF can easily be utilized by the user of the program.

II.POWER WORLD SIMULATOR FEATURES

Main feature of Power world simulator are; optimal power flow analysis tools, available transfer Capability (ATC), Transient Stability, Voltage stability (PVQV), Area generation Control simulation. Power World Simulator is an interactive power system simulation package designed to simulate high voltage power system operation on a time frame ranging from several minutes to several days. The software contains a highly effective power flow analysis package capable of efficiently solving systems of up to 250,000 buses. Power World's wide range of products provide the tools needed by transmission planners, power marketers, system operators and trainers, educators, and anyone else desiring access to power system information and analysis in a user-friendly format.

Power world simulator includes a variety of additional tools, as follows.

A. Model Explorer
B. Presentation Tools
C. Interactive, Animated Diagrams
D. Contingency Analysis
E. Geographic Information Systems (GIS)
F. Time-Step Simulation (TSS)
G. Automated Diagram Creation and Modification Tools
H. Modeling Capabilities
I. Area Generation Control (AGC)
J. Difference Flows
K. Contoured Displays
L. Solutions Options
M. Sensitivities
N. Script Actions
O. Customer Support

III. FLOW CHART WITH POWER CALULATION WITH POWER WORLD SIMULATOR

These Flowchart gives the detail step by step procedure followed for sample seven bus system data using Power world simulator for entering data for load flow study like buses, transmission line, generators, load at particular buses, generator Mw outputs and Mvar, bus nominal Voltage and line limit of transmission line.

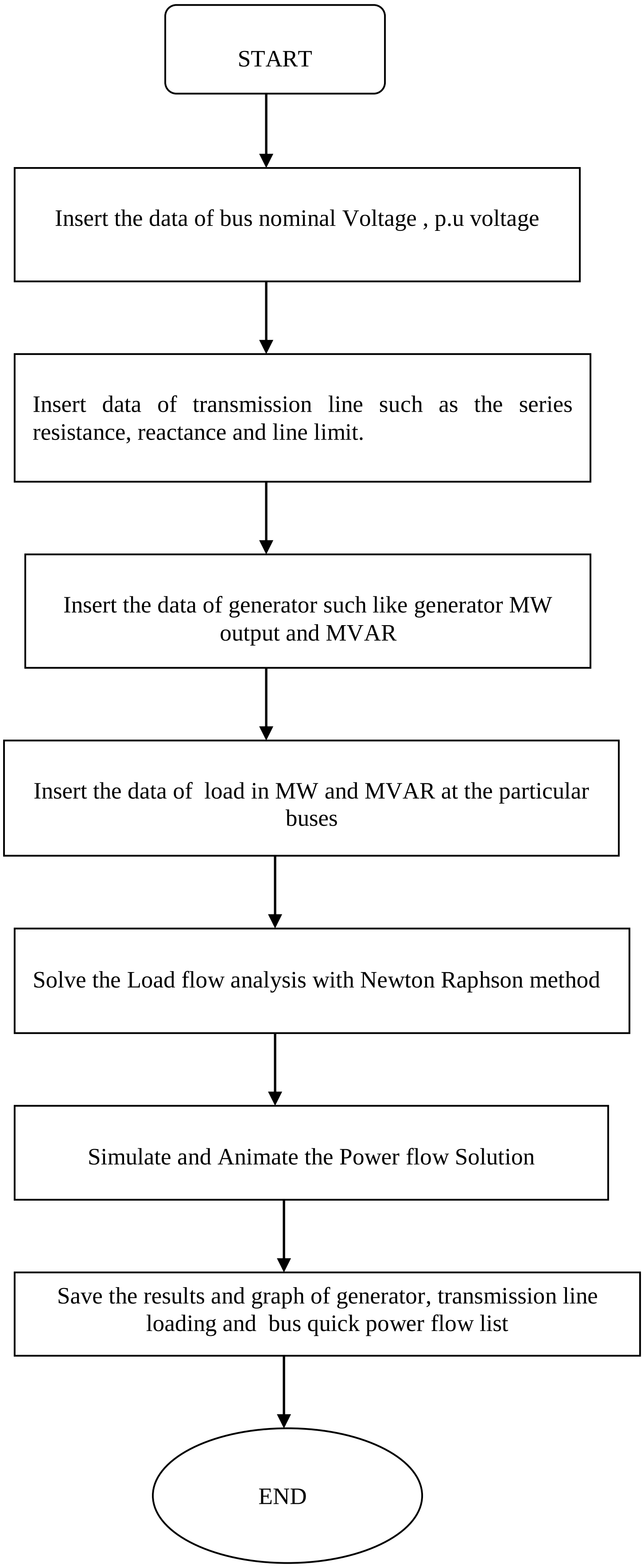

Figure 1.Flow chart of sample seven bus systems with power world simulator

IV.CASE STUDY

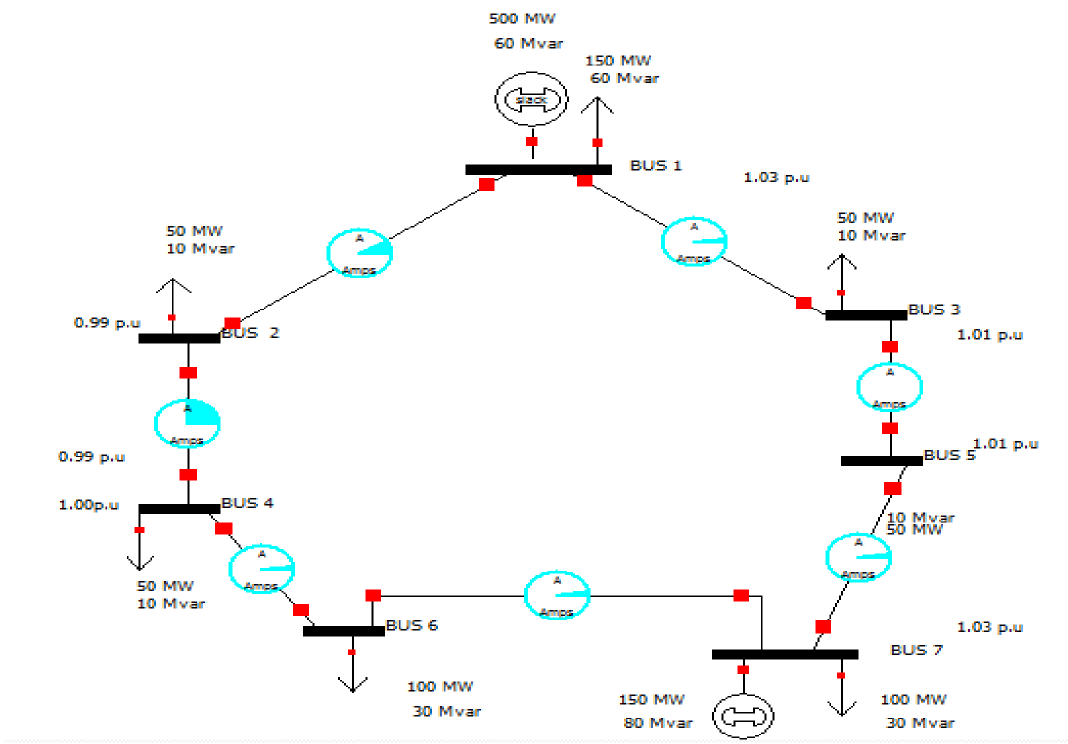

Figure 2.Power world simulator model

This section represent Power world features for load flow analysis by means of sample seven bus test system. Fig. 2 depicts the model of the sample seven -bus network built using the Power world simulator. Once defined Power world simulator also allows displaying bus voltages and power flows for different load levels within simulated model loaded into the system.

A.SEVEN BUS SAMPLE POWER SYSTEM DATA

From Bus	To Bus	R [p.u]	X [p.u]	C [p.u]	Line Limit [MVA]
1	3	0.03	0.05	0.00	800
2	1	0.03	0.05	0.00	800
2	4	0.00	0.02	0.00	1000
3	5	0.11	0.02	0.00	800
4	6	0.07	0.01	0.00	800
6	7	0.06	0.10	0.00	800
7	5	0.07	0.11	0.00	800

Table 1. Line characteristics of seven bus system

Bus Number	Load [MW]	Load [MVAR]	Min Gen. [MW]	Max Gen. [MW].
1	150	60	0	1000
2	50	10	0	0
3	50	10	0	0
4	50	10	0	0
5	50	10	0	0
6	100	30	0	0
7	100	30	0	1000

Table 2.Bus Characteristics of Seven Bus System

V. SIMULATION RESULTS

From Bus	To Bus	MW From	Mvar From	MVA From	Line MVA	% of MVA Limit (Max)	MW Loss
BUS 2	BUS 1	-174.3	14.3	174.9	800.0	23.1	10.22
BUS 1	BUS 3	97.3	-38.8	104.8	800.0	13.1	3.29
BUS 2	BUS 4	124.3	-24.3	126.7	1000.0	12.7	0.00
BUS 3	BUS 5	44.0	-54.3	69.9	800.0	8.7	5.46
BUS 4	BUS 6	74.3	-37.9	83.4	800.0	10.4	5.36
BUS 7	BUS 5	14.8	67.7	69.3	800.0	8.7	3.36
BUS 6	BUS 7	-31.0	-68.7	75.4	800.0	10.4	4.18

Table 3.Representation of Line Record after Simulation

Name	Nominal KV	PU Volt	Volt (KV)	Angle (Deg.)	Load (MW)	Load (Mvar)
BUS 1	132.00	1.00000	132.000	0.00	150.00	60.00
BUS 2	132.00	0.94771	125.098	-5.54	50.00	10.00
BUS 3	132.00	0.99203	130.948	-3.48	50.00	10.00
BUS 4	132.00	0.95320	125.823	-7.12	50.00	10.00
BUS 5	132.00	0.95665	126.278	-7.63	50.00	10.00
BUS 6	132.00	0.90330	119.236	-9.38	100.00	30.00
BUS 7	132.00	1.00000	132.000	-10.02	150.00	60.00

Table 4.Representation of Bus Record after Simulation

VI. CONCLUSIONS

This paper presents the load flow analysis of sample seven bus system using power world simulator software. As linked Gauss seidal method the Newton –Raphson method gives accurate results. Though Fast-Decoupled method takes less time, it gives approximate values. From simulate the above system we cleary find the active, reactive and apparent power flow at the different buses. if suppose the losses in system is high so these losses decrease with the increasing the line limit .The result shows that the power flow calculation is a fast and a high-precision process and at particular buses the P.u. voltage and angle that can be change. Future work will concentrate on studying power flow solution introducing power system operation arrangement.

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