LINEAR LOAD FLOW

FOR CONTINGENCY ANALYSIS

This thesis is presented in partial fulfilment for the award of the

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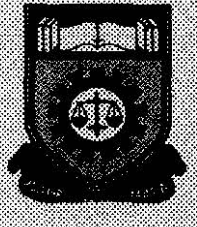

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ABSTRACT

The load flow problem can be defined as the calculation of the real and reactive powers flowing in each line and the magnitude and phase angle of the voltage at each bus of a given transmission system for specified generation and load conditions. The information obtained from the load-flow studies can be used to test the system's capability to transfer energy from generation to load without overloading lines and to determine the adequacy of voltage regulation by shunt capacitors, shunt reactors, tap-changing transformers, and the var-supplying capability of rotating machines.

From the introduction of digital load flow solution by Ward and Hale in 1956, many methods and many modifications and improvements have been proposed from time to time. The relative properties and performances of different load flow methods can be influenced substantially by the types and sizes of problems to be solved.

The following are the main techniques that have been used so far for the power system load flow calculations:

- *Gauss Seidel method.*
- *Newton Raphson method.*
- *Decoupled Load Flow method.*
- *Fast Decouplied Load Flow method.*

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CHAPTER 1

1.0 Introduction To Load Flow

In today's complex power system and power transmission configurations there is an urgent need for us to perform many routines digital-computer power network calculations. Among these calculations, the most frequently performed is the load flow or power flow calculation. The load flow is the solution for the static operating condition of an electric-power transmission system. It is performed for power system and operational planning and in connection with system operation and control; and are increasingly being used to solve very large systems, multiple cases for purposes such as outage security assessment and within more complicated calculations such as optimization and stability.

The data obtained from the load flow studies will be able to provide the user with information regarding the studies of contingency, outage security assessment as well as optimal dispatching and stability. The tern contingency means the loss of a major transmission element or a large generating unit. A double contingency is the loss of two transmission lines, or two generators, or a line and a generator. Contingency analysis is always carried out to check if a system, which is currently in normal state, will continue to be in normal state when a contingency analysis is occurs.