IMPLEMENTATION OF SPREADSHEET FOR POWER SYSTEM LOAD FLOW ANALYSIS

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ABSTRACT

Power flow analysis is the backbone of power system analysis and design. They are necessary for planning, operation, economic scheduling and exchange of power between utilities. The principal information of power flow 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. Power flow analysis is an importance tool involving numerical analysis applied to a power system. In this analysis, iterative techniques are used due to there no known analytical method to solve the problem. To finish this analysis there are methods of mathematical calculations which consist plenty of step depend on the size of system. This process is difficult and takes a lot of times to perform by hand. This objective of this project describes the development of power system load flow analysis using Excel which employed two iteration technique namely Newton Raphson and Gauss Seidel. This application is meant to assist under-graduate students in the studies in load flow analysis. Feedback shows that the application could enable the student to understand the load flow concept easily due to its interactive design and user friendly.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Overview

Load flow studies are used to ensure that electrical power transfer from generators to consumers through the grid system is stable, reliable and economic. Conventional techniques for solving the load flow problem are iterative, using the Newton-Raphson or the Gauss-Seidel methods. Recently, however, there has been much interest in the application of stochastic search methods, such as Genetic Algorithms, to solving power system problems. The increasing presence of distributed alternative energy sources, often in geographically remote locations, complicates load flow studies and has triggered a resurgence of interest in the topic.

The principles of power system load flow studies are taught within elective modules in the later years of undergraduate electrical engineering courses, or as essential components of specialist masters programmes in electrical power engineering. From the educational viewpoint, therefore, the topic is important, yet a complete coverage presents some significant challenges. Pre-requisites include fundamental concepts from a.c. circuit analysis, such as phasor notation, impedance and admittance, power and reactive power, three-phase and per-unit systems, all of which are regarded as 'difficult' by many students. The load flow solution techniques bring extra mathematical hurdles, including matrix representation (with complex number coefficients), iterative methods and probability functions.

Tô assist in the teaching of load flow analysis techniques, the author developed an Excel Workbook in which four different methods were used to solve a simple load flow