# POWER SYSTEM LOAD FLOW ANALYSIS BASED ON FAST DECOUPLED METHOD USING MICROSOFT EXCEL

A thesis submitted in fulfillment of the
requirements for the award of the degree of
Bachelor of Engineering (Hons)
Electrical

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# ACKNOWLEDGEMENT

In the name of Allah, The Most Generous and The Most Merciful, with the deepest sense of gratitude to Allah the Almighty for giving me strength and ability to complete my final year project and thesis.

My deepest gratitude is expressed to my supervisor, Dr Hasmaini Binti Mohamad, UITM's lecture. I also thanks to my entire friend in EE221 for their advice, encouragements and suggestion. I also want to dedicate this acknowledgement to all UITM lectures for any support to make sure the successfully. Finally thanks for my family, especially my mother . Without her encouragement, I would not have finished the degree, for all the guidance, support and advice provided to me throughout the final year project.

Last but not least, I am also would like to express my appreciation to my beloved family, friends and anybody who are involved directly or indirectly for their support and devices during completing my final year project.

Thank you.

# ABSTRACT

This thesis presents a development of a Power System Load Flow Analysis based on Fast Decoupled Method using Microsoft Excel. It is designed to solve a load flow problem with mathematical calculations which are difficult to solve by hand calculation. This educational toolbox will help to facilitate undergraduate electrical studies to determine the value of voltage (V), voltage angle (δ), real power (P) and reactive power (Q) of each bus. Load flow toolbox is evaluated by solving the load flow of several test systems including IEEE bus system. The solution is verified with well known load flow analysis software such as Microsoft Excel, Power World Simulator, MATLAB and PSS Adept. Thè comparison results show the accuracy of the load flow toolbox developed using the Microsoft Excel.

# TABLE CONTENTS

# CHAPTER 1

# INTRODUCTION

## 1.1 BACKGROUND OF STUDY

Load flow studies are most important aspects of power system planning and operation. It used to transfer electrical power from generator to consumer through the grid system. It is important tool involving numerical analysis applied to power system and sinusoidal steady state of the entire system such as voltages, real and reactive power generated and absorbed and line losses [1]. Power flow analysis used to simplified notation such as one line-diagram and per-unit system and to obtain the voltage magnitudes and angles at each bus. When the bus voltage magnitudes and their angles are computed using the load flow, the real and reactive power flow through each line can be computed [2]. The steady state power and reactive power supplied by a bus in a power network are expressed in terms of nonlinear algebraic equations. Therefore would require iterative methods for solving these equations. The advantages of load flow analysis are to determining the best operation of existing system.

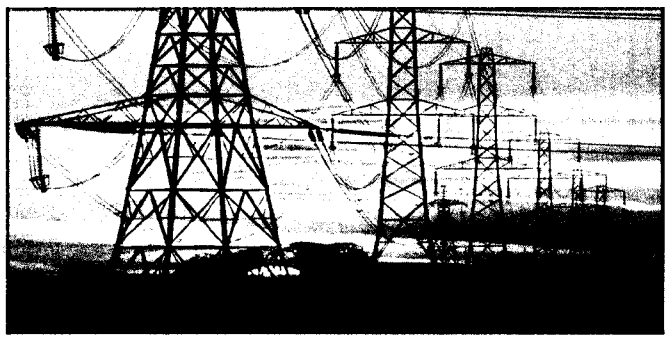

Figure 1.1 Power system network