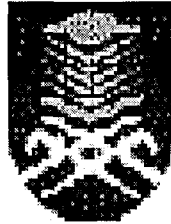


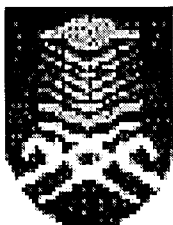
**DEVELOPMENT OF QUADRATIC SENSITIVITY METHOD IN
TRANSFER CAPABILITY COMPUTATION**



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QUADRATIC SENSITIVITY METHOD IN TRANSFER CAPABILITY
COMPUTATION"**

Merujuk kepada perkara di atas, bersama-sama ini disertai 3 (tiga) naskhah laporan akhir penyelidikan bertajuk "DEVELOPMENT OF QUADRATIC SENSITIVITY METHOD IN TRANSFER CAPABILITY COMPUTATION" oleh kumpulan penyelidik dari Fakulti Kejuruteraan Elektrik untuk rekod puan.

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ABSTRACT

In a deregulated electric power industry, transmission providers are required to rapidly produce commercially viable information of accurate available transfer capability (ATC) values so that such information can help power marketers, sellers and buyers in planning, operation and reserving transmission services. Fast and accurate available transfer capability (ATC) methods are required to evaluate the ability of transmission systems to reliably increase power transfer between areas or commercial entities for use in the electricity markets. This report presents a new computationally fast and accurate method for evaluating ATC based on voltage and absolute power sensitivities. The feature of the method is that it formulates the sensitivity factors in the form of second order polynomial equations and the polynomial coefficients are determined so as to avoid the time consuming power flow iterations usually required in the ATC evaluation. Prior to the ATC evaluation, contingency ranking and selection techniques are used to define the critical lines in a system that can adversely affect the transfer capability assessment. The effectiveness of the proposed method is verified by illustrating the ATC evaluation on the Malaysian system and IEEE 9-bus system. ATC results obtained from the proposed quadratic sensitivity method prove that the method is satisfactorily accurate and it is faster than the ATC method using recursive AC power load flow method.

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CHAPTER 1

INTRODUCTION

1.1 New Structure of Electric Power Industry

In recent years, electric power systems are experiencing an epochal revolution due to increasingly competitive market. The epochal revolution of the power system, so called as the deregulation is based on the concept of competitive industries rather than regulated ones, which become prominent in the past few years [1]. Economics and political analysis have promoted the idea that free markets can drive down costs and prices thus reducing inefficiencies in power production. This change in the climate of ideas has fostered regulators to initiate reforms to restructure the electricity industry to achieve better service, reliable operation and competitive rates. In this new business environment it is important for the system operator to know how additional power can be safely transferred across the critical corridors or interfaces of the system without jeopardizing the system security.

In a deregulated market, available transfer capability (ATC) is used to measure the network capability for further commercial activity over and above already committed uses. ATC plays an important role in power systems because a key concept in the restructuring of the electric power industry is the ability to