# VULNERABILITY STUDY IN POWER SYSTEM TRANSMISSION

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**MUHAMMAD NORAZAM ABDUL RAHIM**

**Faculty of Electrical Engineering**

**40450 Shah Alam, Malaysia**


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## ABSTRACT

Voltage stability is playing a major role in power system due to continuous demand in power transmission system. This demand if it is unplanned would cause system disturbance leading to possible system collapse. Therefore an off-line study is required in order to avoided the possibility of voltage collapse. This phenomenon can be regarded to system vulnerability. Vulnerability of a system cab be reformed to either caused by generators or loads. This thesis presents vulnerability studies of a power system network. Vulnerability Indices ( VI ) and Margin Indices ( MI ) are utilized to assess the system performance Test was conducted on the IEEE 24-Bus RTS.

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## 1.0 Introduction

Due to the complexity and the hugeness of the practical power system network, the stability of power system has been divided into small portion such as transient stability, dynamic stability and voltage stability. The voltage instability is a kind of the system instability phenomenon is actually starts from one bus or a few buses and it will extended to entire power system. The effect of the instability in the power system is that, it might caused the stress over the conductors and as the result the insulator failed to act eventually blackout occurred. The major problems for the TNB is that, they do not know the security condition very accurate. When the unexpected things happen, the TNB has insufficient information to keep the system secure. If the outages occurred within the power system, it will establish the instability, if the appropriate load shedding had been taken, the large area blackout could be prevented[1].

For instance, in the year 2003, southern Peninsular Malaysia the electricity blackout crisis affected the southern part of Peninsular Malaysia, including Kuala Lumpur, Selangor, Negeri Sembilan, Melacca and Johore due to the power failure. The Northeastern blackout in August 2003, the First Energy system operator did not know that they would run their system vulnerable due to the next contingency [11].The five States ( Including Kuala Lumpur) had been affected for 5 hours from 10.00 am. The most terrible power outage in Malaysia was in 1992, all the peninsular Malaysia turned into darkness when the switchgear in Paka Terengganu was malfunctioned and consequently it puts so much stress on the grid system, therefore it is create the instability situation on the system and finally trips all the generator stations within the grid accordingly.

There are several methods that can be used to analyze the system security in the power system and one of the method is that by using the Performance Index(PI). This method was first proposed to evaluate the line loading and voltage performance, however to analyze the static security information for different elements, the PI method is can not be used [1].