# VOLTAGE STABILITY PREDICTION IN POWER SYSTEM USING ARTIFICIAL NEURAL NETWORK

**IRFAN HANAFI BIN JAMALUDDIN**

**FACULTY OF ELECTRICAL ENGINEERING**

**UNIVERSITI TEKNOLOGI MARA**

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**Irfan Hanafi bin Jamaluddin**
Faculty of Electrical Engineering,
Universiti Teknologi MARA,
Shah Alam, Selangor.

# TABLE OF CONTENTS

# ABSTRACT

Voltage instability has become one of the sudden interest in modern power system industry since it can initiate a critical event called voltage collapse or blackout in a system. Therefore, voltage stability management is vital in order to avoid loss of power and operating cost. This paper presents an application of Fast Voltage Stability Index (FVSI) and Artificial Neural Network (ANN) in determining the voltage stability for IEEE 30-Bus System. In this project, different load variations will be implemented which based on reactive power for voltage stability analysis. FVSI for each line will be calculated and the weakest line which has high value of FVSI and bus which has the lowest voltage will be identified. Next, the overall data from FVSI analysis will be collected and undergo training and testing in a multi-layer Feed Forward ANN for voltage stability determination. The simulation of FVSI and ANN is executed using MATLAB R2011a software.

**Keywords – Fast Voltage Stability Index, Voltage Stability, Artificial Neural Network**

# CHAPTER 1

# INTRODUCTION

## 1.1    OVERVIEW

Voltage stability can be defined as the capability of the power system to maintain a satisfactory range due to contingency [1]. Contingency or in other words is the sudden interference occurs in the power system which can be caused by insufficient amount of reactive power supplied and outages of line and generator in the system. This type of interference can contribute to voltage collapse or power system blackout. For the past decade, many developed countries have encountered a major blow for their system blackout for example, 2003 in Italy [2] where Italian Power system have encountered a major loss where it affects an area with an estimated of 60 million people and 180 GWh energy were not delivered. In 2006, a bigger problem was encountered which it involves the whole Europe to experience power blackout [3]. It is caused by tripping of interconnection lines due to overload by the disconnection and also bad coordination between the system operators.

In Malaysia, there are series of blackouts throughout the decades. It started in 1992 where whole country suffered a major blackout due to lightning strike that struck some of the transmission facility that leads to electrical failure in transmission and distribution system. It is followed by cases in 1996 where Peninsular Malaysia undergo some power outage due to some tripping problem in transmission line near Sultan Ismail Power Station in Paka, Terengganu that cause all power stations in Peninsular Malaysia to collapse. Next, there are several series of blackouts happen in 2003, 2005 and 2013 which is caused by the same problem.

1