

**EMPLOYMENT OF EVOLUTIONARY PROGRAMMING  
TECHNIQUE FOR LOADABILITY ENHANCEMENT DURING  
LINE OUTAGE**

**Thesis presented in partial fulfillment for the award of the  
Bachelor of Engineering (Hons) Electrical  
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## **ABSTRACT**

Nowadays the rapid, continuous and increasing demand in electrical power system network especially inductive load has become major caused to the system's strength under stress and critical condition. Indirectly this problem affects the power system's loadability and stability. Optimal value of reactive power support is vital to improve the condition. Insufficient of reactive power support leads to undesirable voltage breakdown as well as transmission line to outage. This paper presents the employment of Evolutionary Programming (EP) to determine the optimal value of reactive power support by specifying the best value of capacitance to improve the load margin (LM) under single line outage. In order to prove the effectiveness of this technique, justification is conducted on the IEEE-30-Bus Reliability test system. The result revealed that the technique used is capable to improve the LM in contingency condition.

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# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

The rapid expansion in power system grid or network today could cause increasing of power system plant output to meet and survive with the high demand. This caused the power system to be more complex since couple years ago. It become heavily stressed and loaded due to the difficulty in constructing new transmission systems as well as the complexity of build new generation plants near the load centers.

The events of voltage collapse (VC) on a transmission system are often caused by a low voltage initial profile, excessive demand, insufficient reactive power supply and many more. If that events continuously happen, it will cause the system become worst and can lead to blackout to the consumers. But since years ago, voltage stability which combines with voltage collapse (VC) due to line outage incident has been recorded as the major cause of many black out happened in power system. The demand for voltage stability enhancement has arisen many interests in the power system field. Until now the above situation has becomes a serious issue in power system although the system has upgraded from year to year.

The VC [1-2] always occurs when the system is heavily loaded which means the load demand exceeding the limit. This circumstance also will become worse if one of the lines of the system down or outage.