# STATIC VOLTAGE COLLAPSE ASSESMENT (SVCA) FOR BULK POWER SYSTEM NETWORK

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## ABSTRACT

This thesis presents the static voltage collapse assessment for bulk power system network. The study involves computation of line stability factor termed as LQP to indicate the voltage stability in a Power System. LQP was formulated based on a transmission line model and used to identify the voltage stability condition is of all lines in a system. The voltage stability assessment was performed on several loading conditions in order to identify the effect of increase in loading to line sensitiveness in the system. The proposed static voltage collapse assessment was tested on the 57 Bus Reliability Test System (RTS). Several load buses were subjected to load variation for this assessment.



*Keywords* – Power flow solution and line stability factor (LQP).

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# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction

Power system voltage collapse is a very complex subject that has been challenging the power system engineers in the past two decades [1]. As interconnections between independent power systems were found to be economically attractive, the complexity of the voltage collapse problem increased. In recent years voltage instability has been responsible for several major voltage collapse incidents [2]. A number of trends in system design and operation have contributed to this situation. Power systems are operated closer to their transmission capability limits due to economic and environmental considerations. The situation is often compounded by delay in building transmission lines due to lengthy and complex approval process. These trends have contributed to voltage collapse problems.

When a bulk power transmission network (generation and transmission system) is operated closed to voltage stability limit, it becomes difficult to control the reactive power demand for that system. As a result, the system voltage stability will be affected, which if undetected may lead to voltage collapse. These issues have subsequently motivated further research in the area of voltage stability analysis. Many techniques have been developed in order to evaluate voltage stability in a system [3]

This thesis presents the static voltage collapse assessment in a bulk power network. The use of a pre-developed line stability factor, termed as LQP has been effectively assessed the possibility of voltage collapse in a bulk power system network.