

**VOLTAGE SAGS MITIGATION TECHNIQUE USING
PSCAD/EMTDC**

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ABSTRACT

For some decades, power quality did not cause any problem, because it had no effect on most of the loads connected to the electric distribution system. When an induction motor is subjected to voltage sag, the motor still operates but with a lower output until the sag ends. With the increased use of sophisticated electronics, high efficiency variable speed drive, and power electronic controller, power quality has become an increasing concern to utilities and customers. Voltage sags is the most common type of power quality disturbance in the distribution system. It can be caused by fault in the electrical network or by the starting of a large induction motor. This project intends to investigate mitigation technique that is suitable for different type of voltage sags source with different type of loads. The simulation will be using PSCAD/EMTDC software. The mitigation techniques that will be studied are Dynamic Voltage Restorer (DVR), Distribution Static Compensator (DSTATCOM) and Solid State Transfer Switch (SSTS). All the mitigation techniques will be tested on different type of faults. The analysis will focus on the effectiveness of these techniques in mitigating the voltage sags. The study will also investigate the effects of using the techniques to voltage sag magnitude. At the end of the project it is expected that a few suggestions can be made on the suitability of the techniques.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Both electric utilities and end users of electrical power are becoming increasingly concerned about the quality of electric power. The term *power quality* has become one of the most prolific buzzword in the power industry since the late 1980s [1]. The issue in electricity power sector delivery is not confined to only energy efficiency and environment but more importantly on quality and continuity of supply or power quality and supply quality. Electrical power quality is the degree of any deviation from the nominal values of the voltage magnitude and frequency. From a customer perspective, a power quality problem is defined as any power problem manifested in voltage, current, or frequency deviations that result in power failure or disoperation of customer of equipment [2].

Power quality problems concerning frequency deviation are the presence of harmonics and other departures from the intended frequency of the alternating supply voltage. On the other hand, power quality problems concerning voltage magnitude deviations can be in the form of voltage fluctuations, especially those causing flicker. Other voltage problems are the voltage sags, short interruptions and transient over voltages. Transient over voltage has some of the characteristics of high-frequency phenomena. In a three-phase system unbalanced voltages also is a power quality problem. Among them, two power quality problems have been identified as the major concern to the customers are voltage sags and harmonics, but this project will be