

366/15/09/14

Name of the Scholar : Sunil Kumar Chaudhry  
Name of the Supervisor : Prof. Z. A. Jaffery  
Department : Electrical Engineering, Faculty of  
Engineering and Technology JMI  
Title of Thesis : Quality assessment of soft computing  
Based control of Inverters

---

### ABSTRACT

Over the past few decades, with the growing use of sophisticated controllers and equipment in industries, homes and in hospitals, continues reliable quality of electrical power has become extremely crucial to many power users. Electrical systems are subject to a wide variety of power quality problems which can interrupt production processes, affect sensitive equipment, and equipment loss. Momentary voltage fluctuations can terribly impact production whereas extended outages have an even greater impact. Voltage fluctuations can also impact the stability and reliability of utility transmission and distributions. In these situations an uninterruptable power supply(UPS) systems may provide a better solution. An uninterruptable power supply provides a finite source of electrical power to support selected critical loads during a loss of normal power and protects power-sensitive equipment from the detrimental effects of disturbances such as voltage sags, surges, transients, harmonics, momentary disruptions, and complete outages.

The problem associated with quality of power and its control have increasing alarmingly and these have formed the basis of many technical studies, field test and new controller design for uninterruptable power supply. In recent years due to numerous technical and economical

reasons the uses of distributed power generation and renewable energy sources for electricity generation have increased. Therefore the efforts are always on to make the operation and control of the UPS systems more reliable, economical and effective. Intelligent systems based on microprocessors and computers have been employed for the monitoring and control of modern UPS systems, there by overcoming the difficulties and limitations of conventional control schemes. The foremost requirement of an uninterruptable power supply is to provide uninterrupted and clean AC power. The clean ac power means undistorted, unaffected power irrespective to deviation in load. The main building block of UPS is an inverter.

In this thesis, a stand-alone single phase voltage source UPS like inverter system using a battery cell as the primary energy source has been proposed by using different controlling schemes to produce quality sinusoidal output voltage. The proposed single-phase inverter is suitable for residential power generation, especially for stand-alone and UPS applications. The different controlling techniques have been analyzed for the inverter so that output voltage and current can be maintained at rated values, irrespective of the loading conditions. The proposed controlling scheme for inverter system illustrates a simple structure with only an output voltage sensor on the load side, and exhibits excellent performance. The main objective of the work is to achieve comprehensive depth understanding of widely preferred PWM inverter module for UPS system. It includes

- Modeling of a Single Phase Voltage Source Inverter with an output voltage and %age THD as low as possible for UPS application.
- To simulate the system for different possible linear & non-linear loads.
- Soft computing based control of inverter