Chapter 7

Conclusions

7.0 General

This research is primarily focused on design and development of DSP based data acquisition system and processing of various power quality parameters for practical industry applications. Various techniques are proposed for real time measurement of power quality parameters such as frequency, power, harmonics and flicker. A simplified control algorithm is modeled and analyzed for measurement of this power quality parameter. A prototype is developed using advanced Digital electronics to demonstrate the feasibility of the proposed algorithms and topology.

In Chapter I, a brief overview on the various power quality parameters are described. A brief introduction to the presently available systems is presented and motivation to do further research in measurement techniques.

In Chapter II, various algorithms available for frequency measurement are described in detailed. This chapter also describes the drawback in using these methods. An algorithm is proposed for real time measurement of frequency using digital filters. The algorithm is

mathematically evaluated and detailed simulation is carried under various conditions. All the practical issues related to the implementation are addressed and discussed in detailed. The algorithm is also tested on a DSP board. The DSP board is interface with a VB based software for display of frequency. Experimental results support the simulation study.

In Chapter III, various algorithms are described for measurement of active and reactive power in case of interconnected power system. Importance of four quadrant power measurement is described in detail and a new tariff structure is proposed in case of inter-connected power system. Detailed simulation of the proposed algorithm is done under various conditions. Hardware implementation of the proposed algorithm is described in detailed using DSP. Experimental results support the simulation study.

In Chapter IV, various algorithms are described for measurement of harmonics. An adaptive filter based Kalman model is proposed for real time tracking of harmonics. Detailed simulation of the proposed algorithm is done under various conditions. Hardware implementation of the proposed algorithm is described in detailed using DSP. Experimental results support the simulation study.

In Chapter V, importance of flicker measurement is described in detailed. The chapter includes the various International standards available for flicker measurement. The chapter describes one digital technique based flicker measurement. Simulation and mathematical modeling of the proposed algorithm is done under various conditions. Hardware implementation of the proposed algorithm is described in detailed using DSP. Experimental results support the simulation study.

Chapter VI emphasis on the practical implementation aspect of the various techniques described before using a multiprocessor architecture. The chapter demonstrates various DSP techniques employed for implementing multiprocessor architecture so as to capture real time data to the server. VB based software resides in the PC for capturing the data from the master DSP card and displaying it to the PC.

7.1 Suggestions for future work

Continuation of the work in this dissertation could be focus on the real time estimation of other power quality parameters and their effect on unbalanced input voltage conditions. The real time algorithms presented in the thesis are for frequency, power, harmonics and flicker. Further investigation would also be required for any disturbance such as transients, sags and swells and effect of these parameters on measurement algorithm. A suitable control algorithm can be designed and implemented which would be common to all the power quality parameters. Practical implementation can be done on high end DSP to study and verify the algorithm for unbalance and transients conditions.

PAPERS ACCEPTED AT INTERNATIONAL AND NATIONAL CONFERENCES

Sr. No	NAME OF CONFERENCE	ORGANIZED BY	DATE OF CONFERENCE	TITTLE
1.	Embedded System and Emerging Trends	IETE, Vadodara	Jan 2005	Embedded Technology in Energy Metering
2.	14th National Power System Conference-NPSC-07	IIT Roorkee	Dec-2006	On line Power System Frequency Measurement Under Non-Sinusoidal Conditions
3.	Recent Advanced Applications of computers in Electrical Engineering" (RACE-07)	Engineering College, Bikaner Sponsored by IEEE	March 2007	On line tracking of power system harmonic using Kalman filter
4.	Power-07	World Scientific And Engineering Academy and Society (WSEAS) Beijing, China	Sept 2007	On-Line Measurement of Power Quality Parameters Using Signal Processing Techniques
5.	4th International Conference on Power System Protection and Automation	CBIP-New Delhi in association with CIGRE	Nov 2007	DSP Based Algorithms for Four Quadrant Measurement of Power
6.	NUCONE-2007	Institute of Technology, Nirma University Ahmedabad	Dec 2007	A Multiprocessor Based System for Real Time Measurement of Power Quality Parameters
7.	IEEE PES Transmission and Distribution Conference and Exposition	IEEE PES in Chicago, Illinois, USA	April 2008	Power Measurement and Measures to Increase Safety Margin in an Interconnected Power System