HARDWARE IMPLEMENTATION OF SOME ADVANCE CONTROL ALGORITHMS IN DSTATCOM

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE

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Submitted by:

Archana Sharma

(2K12/ C&I/ 03)

Under the supervision of

Prof. Madhusudan Singh

DEPARTMENT OF ELECTRICAL ENGINEERING

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

Bawana Road, Delhi-110042

INDIA

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DEPARTMENT OF ELECTRICAL ENGINEERING

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

Bawana Road, Delhi-110042

CERTIFICATE

I, **Archana Sharma**, Roll No. 2K12/C&I/03, a student of M. Tech. (Control & Instrumentation), hereby declare that the dissertation titled "**Hardware Implementation of Some Advance Control Algorithms in DSTATCOM**" is a bonafide record of the work carried out by me under the supervision of **Prof. Madhusudan Singh** of Electrical Engineering Department, Delhi Technological University in partial fulfilment of the requirements for the award of the degree of Master of Technology and has not been submitted elsewhere for the award of any other Degree or diploma.

Place: Delhi **(Archana Sharma)**

Date:

(Prof. Madhusudan Singh)

SUPERVISOR

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ARCHANA SHARMA

M.Tech, Control & Instrumentation

Electrical Engineering Department

Roll No. 2K12/C&I/03

ABSTRACT

This dissertation deals with Hardware Implementation of Some Advance Control Algorithms in DSTATCOM. Power quality of distribution systems is influenced by different events in the real time operation of the utilities supply network. It is important to identify these factors and develop remedies for their reduction or removal. In this dissertation, main contribution is to implement some of advanced control algorithms for DSTATCOM (Distribution Static Compensator) to enhance its operational flexibility, robustness, tracking capability, accuracy, dynamic response etc. according to the requirements. In the present work four control algorithms are implemented for control of a DSTATCOM for elimination of harmonics in supply current, improvement of power factor & reactive power compensation. These are SRF (Synchronous reference frame) theory, Anti-Hebbian learning algorithm, CTF (Character of triangle function) and ILST (Improved Linear Sinusoidal Tracer) based control algorithms. These control algorithms are based on artificial intelligence, mathematical calculations and on some improved features of previous conventional algorithms. The operation of a DSTATCOM is demonstrated for mitigation of harmonics in source current due to non-linear loads on supply system. These algorithms use two closed loop PI controllers mainly for regulating supply side AC voltage magnitude and DC link capacitor voltage. The control algorithm generates reference supply current for providing PWM signals through PWM controller. Pulse width modulation or hysteresis current controller is used for generation of PWM gating pulses of IGBT's in the VSI. The proposed algorithms are simulated in MATLAB/SIMULINK & also hardware model for the same is developed and tested in different operating conditions. Results of both simulation and hardware are presented and discussed for harmonic elimination and power factor correction at the AC supply terminals. It is observed that Anti-Hebbian algorithm is effective method to reduce harmonics in supply current from 24.3% to 2.47%, whereas CTF is most simple and easy to implement but it has some time delay in compensation.