APPENDIX A

RATING AND PARAMETERS OF THREE PHASE SQUIRREL CAGE INDUCTION MOTOR

The induction motor used in the MATLAB simulation & the hardware has the following Specifications:

3-phase Squirrel cage induction motor, Delta (Δ) Connected,

Power rating	3HP (2.238KW)
Stator voltage	415 V (50 Hz)
Rated stator Current	8.5 A
Rated Speed	1440rpm (150 rad/sec)
R_s, stator resistance	3.3 Ω
R_r, rotor resistance,	3.22 Ω
L_{ls}, stator leakage inductance	0.0133 H
L_{lr}, rotor leakage inductance	0.0133 H
L_m, magnetizing inductance	0.144 H
J, moment of inertia	0.002 Kg m2
P, number of poles	4

APPENDIX B

HYSTERESIS PWM CONTROLLER

In this circuit three phase load is connected to the PWM voltage source inverter. The load currents i_a, i_b and i_c are compared with the reference currents i_a^*, i_b^* and i_c^* and error signals are passed through hysteresis band to generate the firing pulses, which are operated to produce output voltage in manner to reduce the current error.

The principle of Hysteresis current control is very simple. The purpose of the current controller is to control the load current by forcing it to follow a reference one. It is achieved by the switching action of the inverter to keep the current within the Hysteresis band. The load currents are sensed & compared with respective command currents by three independent Hysteresis comparators having a hysteresis band 'h'. The output signals of the comparators are used to activate the inverter power switches.

In this scheme, the hysteresis bands are fixed throughout the fundamental period. The algorithm for this scheme is given as

$$I_{ref} = I_{max} \sin\omega t$$

Upper band has current which is given by

$$i_{up} = i_{ref} + h$$

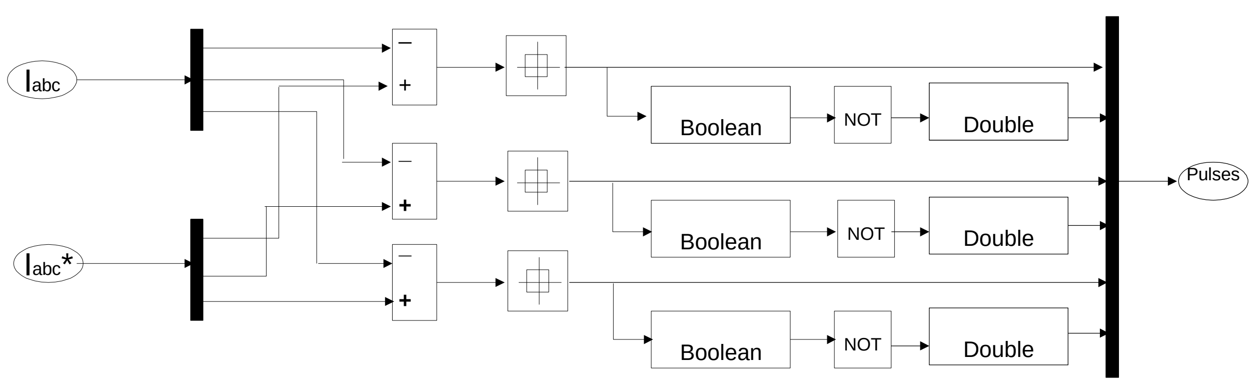

Figure hysteresis controller

Fig Actual waveform obtained from hysteresis controller

Upper band has current which is given by

$$i_{low} = i_{ref} - h$$

Where h= hysteresis band limit

Condition of operation of Hysteresis controller

$$i_a > i_{up}, v_o = -{}^{v_{dc}}/_2$$

$$i_a < i_{up}, v_o = {}^{v_{dc}}/_2$$

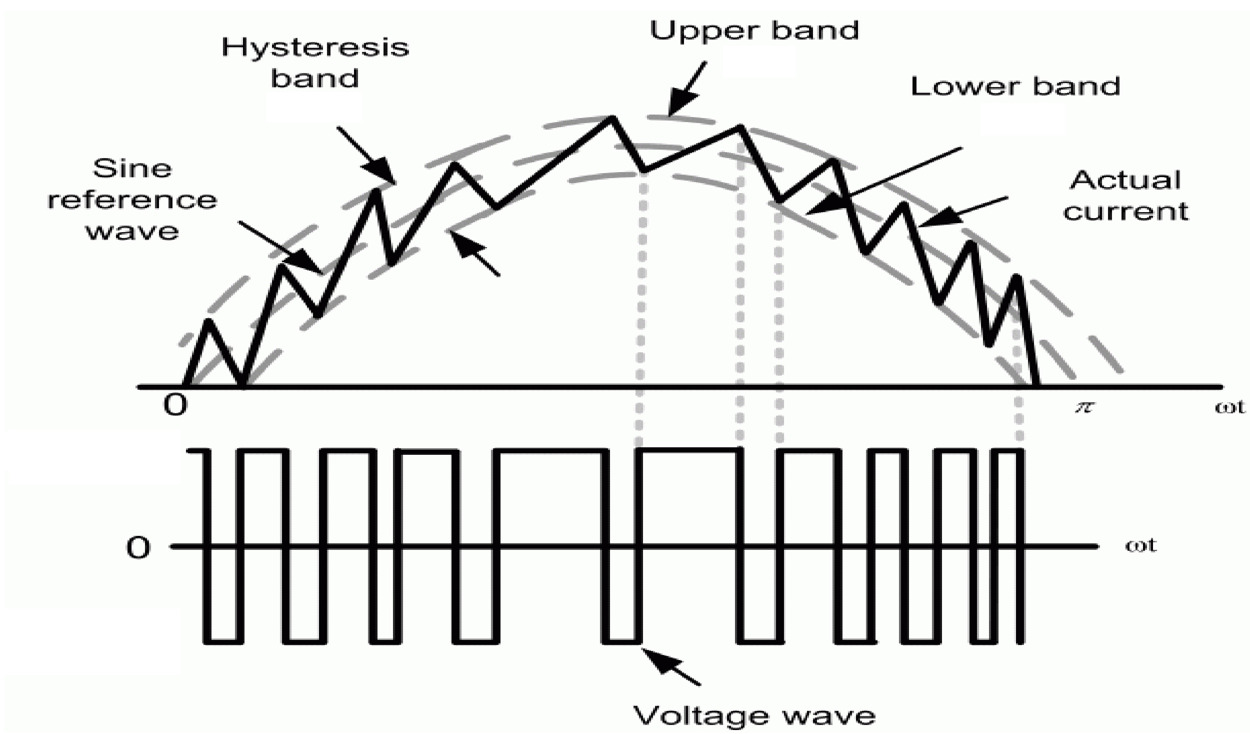

Figure Actual operation of hysteresis controller

APPENDIX C

D SPACE 1104

DS-1104 technical specifications

Main Processor:	• MPC8240, PowerPC 603e core, 250 MHz
	• 32 KB internal cache
Timers:	• 1 sample rate timer, 32-bit down counter
	• 4 general purpose timers, 32 bit
	• 64-bit time base for time measurement
Memory:	• 32 MB synchronous DRAM (SDRAM)
	• 8 MB boot flash for applications
Interrupt Control Unit:	• Interrupts by timers, serial interface, slave DSP, incremental encoders, ADC, host PC and 4 external inputs
	• PWM synchronous interrupts
Analog Input:	• 4 ADC inputs, 16 bit, multiplexed
	• ± 10 V input voltage range
	• 2 μ s sampling time
	• >80 dB signal-to-noise ratio
	• ADC channels, 12 bit
	• ± 10 V input voltage range
	• 800 ns sampling time
	• > 65 dB signal-to-noise ratio
Analog Output:	• 8 channels, 16 bit, 10 μ s max. Settling time
	• ± 10 V output voltage range
Incremental Encoder:	• Two digital inputs, TTL or RS422
Interface:	• 24-bit digital incremental encoders
	• Max. 1.65 MHz input frequency, i.e. fourfold Pulse counts up to 6.6 MHz
	• 5 V / 0.5 A sensor supply voltage

Digital I/O:	• 20-bit digital I/O (bit-selectable direction) • ± 5 mA output current
Serial Interface:	• Serial UART (RS232, RS485 and RS422)
Slave DSP Subsystem:	• Texas Instruments' DSP TMS320F240 • 4 kWord of dual-port RAM • Three-phase PWM outputs plus 4 single PWM outputs • 14 bits of digital I/O (TTL)
Physical Characteristics:	• Power supply 5 V, 2.5 A / -12 V, 0.2 A /12 V, 0.3 A • Requires one 32-bit PCI slot