HYSTERETIC CONTROLLED DUAL ACTIVE BRIDGE TYPE DC TO AC CONVERTER SYSTEM WITH IMPROVED RESPONSE

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ABSTRACT:

DC to DC converter is preferred because of size and reduced stresses in switches. This work deals with hysteretic controlled DC to AC Converter. Low voltage DC is converted into high voltage DC using a DC to DC Converter. The DC output from DCDCC is converted to power frequency AC using a half bridge inverter closed loop systems with and without hysteretic controller are simulated and their results are compared. The results indicate that the proposed system with hysteretic controller has reduced THD content.

I.INTRODUCTION:

Comprehensive Relationship Between Carrier – Based PWM and Space Vector PWM in a Five-Phase VSI is given by Moinuddin[1]. Space vector modulation scheme for a five-phase voltage source inverter is given by Levi[2]. Space vector PWM techniques for sinusoidal output voltage generation with a five-phase voltage source inverter is given by Levi[3]. Relationship between Space vector modulation and three-phase carrier based PWM – A comprehensive analysis is given by Wang[4]. Multi-phase space vector pulse width modulation is given by Miller[5]. Space vector model of a five-phase voltage source inverter is given by Iqbal[6]. Unified voltage modulation method for dual three-phase induction machine is given by Yang[7]. Multi-phase induction machine drive research is given by Singh[8]. A literature survey of state-of –the-artin multiphase ac drives is given by Levi[9]. Pulse Width Modulation or Power Converters – Principles and Practice is given by ALipo[10]. Control in power electronics – selected problems is given by Krishnan[22];. A five-level inverter voltage space phasor generation for an open-end winding induction motor drive is given by Baiju[12]. Sine-triangle versus space vector modulation for three-level PWM voltage source inverters is given by Wang[13]. A New Space Vector Modulation Alogorithm for THD Reduction in 5-phase Voltage Source Inverter is given by Bayati[14].

II. SIMULATION RESULTS:

The closed loop without hysteresis controller system is shown in figure 3.1. Actual voltage is compared with the reference voltage and error is applied to a PI Controller. The input voltage is shown in figure 3.2 and the voltage increases from 25v to 35v.

The output voltage of the inverter is shown in figure 3.3. The peak value is 300v. The output power is shown in figure 3.4 and its value is 100w.

The output current response is shown in figure 3.5 and the peak value is 0.5A. The THD for output current is shown in figure 3.6 and the THP content is 6.83%

The closed loop system with hysteresis controller is shown in figure 4.1. A hysteresis block is introduced at the input voltage is shown in figure 4.2 and it increases from 25v to 30v.

An the output voltage response is shown in figure 4.3 and the output voltage sector at the set value.

The output current is shown in figure 4.4. An output of power is shown in figure 4.5. The THD for output current is shown in figure 4.6.

The comparison of time domain parameters is shown in table 1. The response with hysteresis controller is superior to that of PI Controller.

The comparision of current THD is shown in table 2. The THD is reduced by 2.1% in the case of hysteresis controlled system.

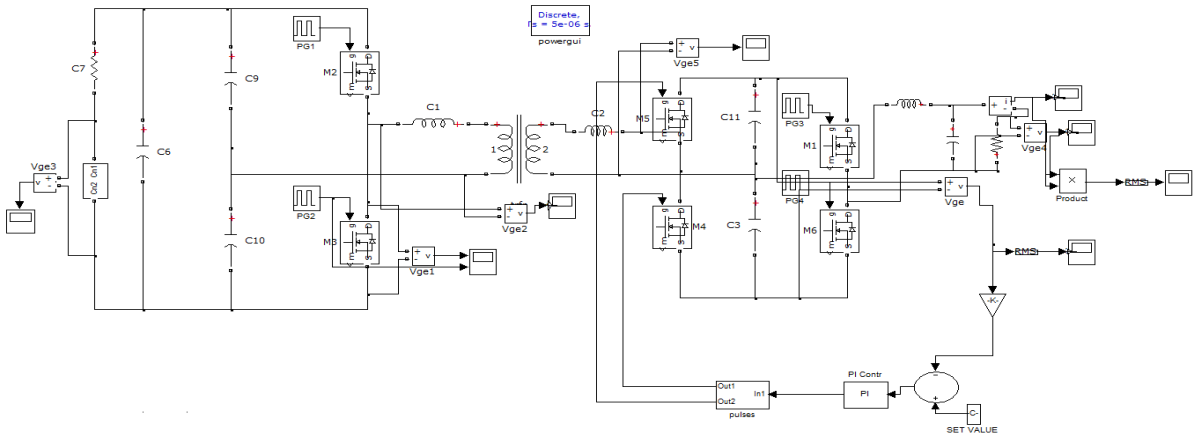

Fig 3.1 Closed loop without hystersis controller

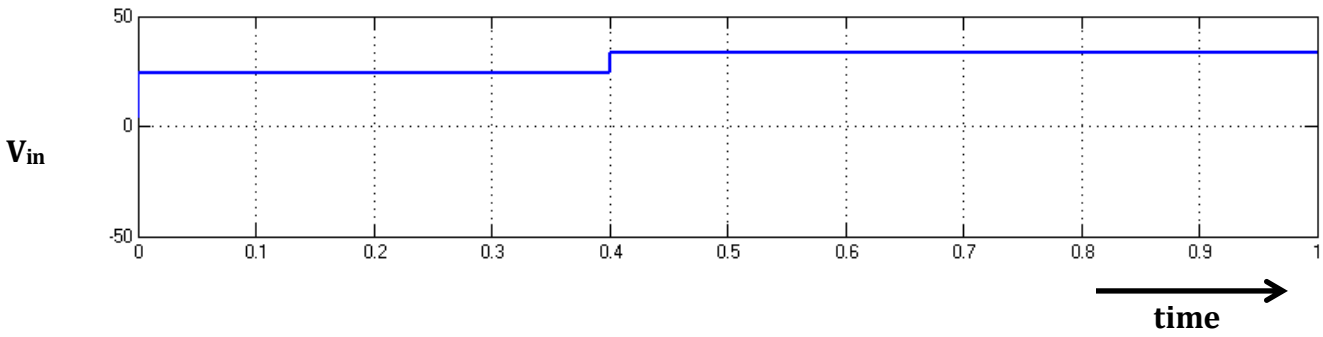

Fig 3.2 Input voltage

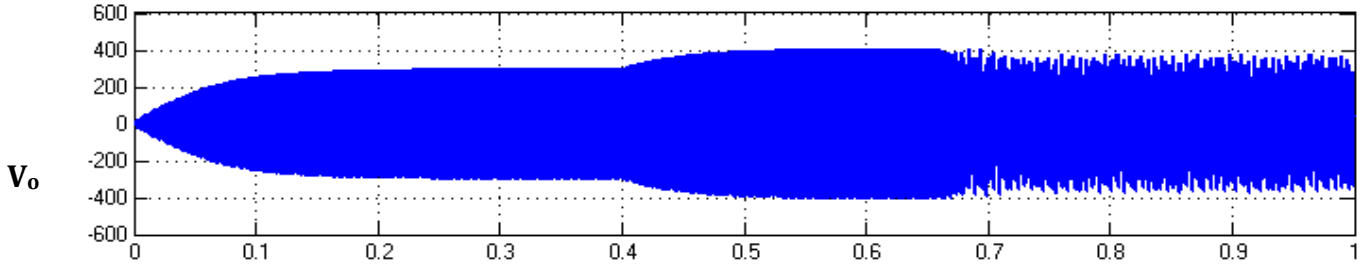

Fig 3.3 Output voltage

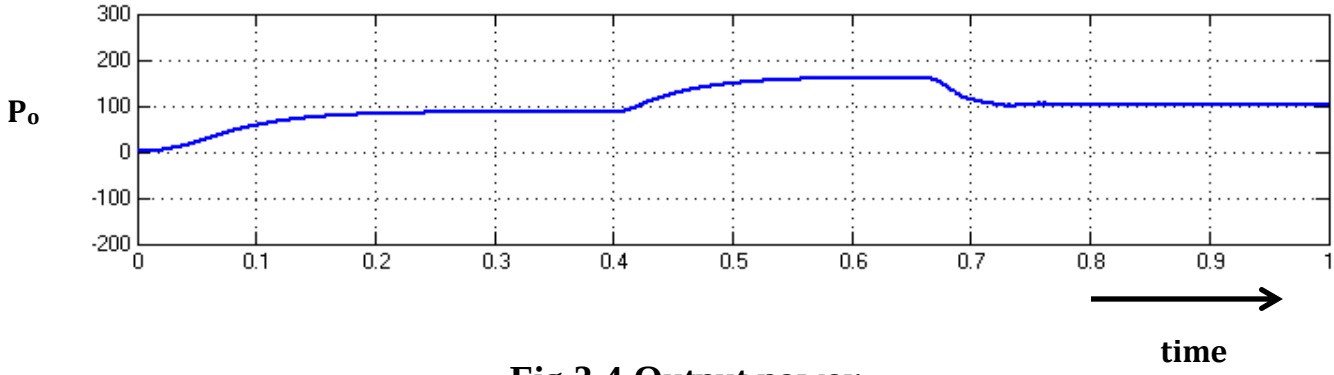

Fig 3.4 Output power

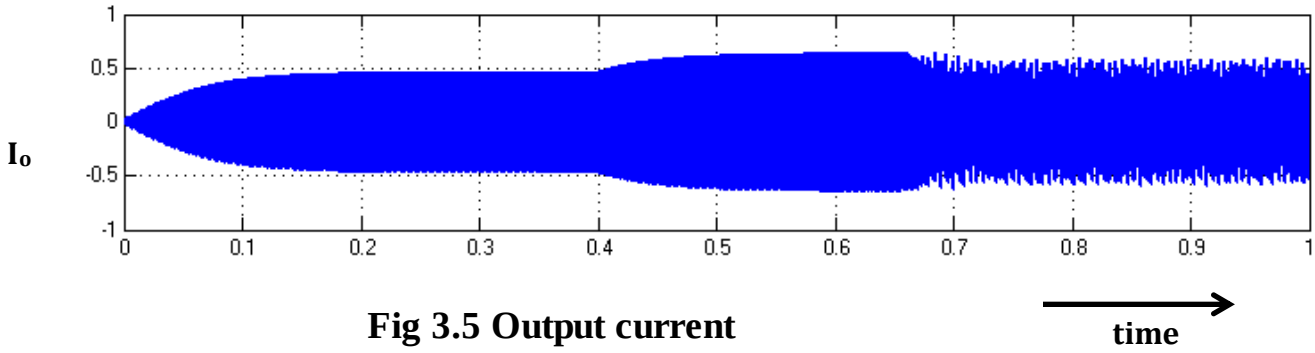

Fig 3.5 Output current

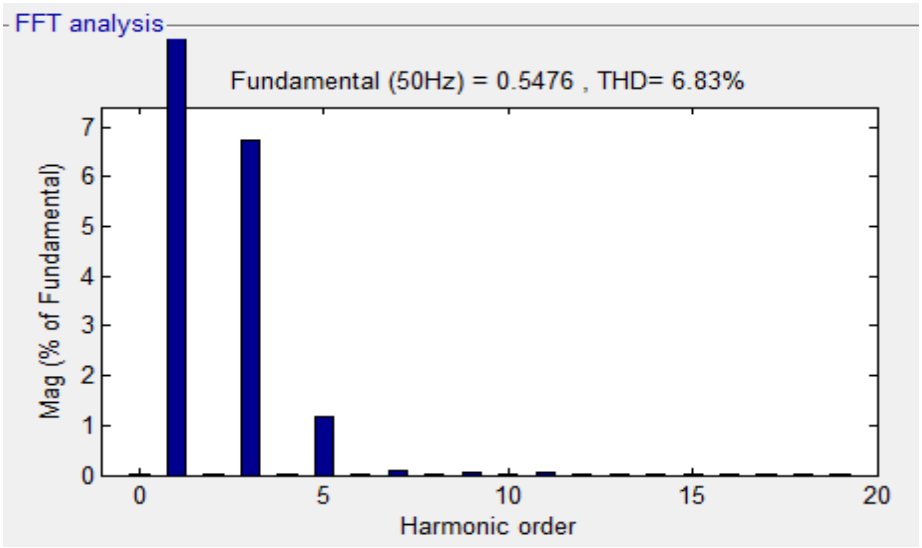

Fig 3.6 Output current THD

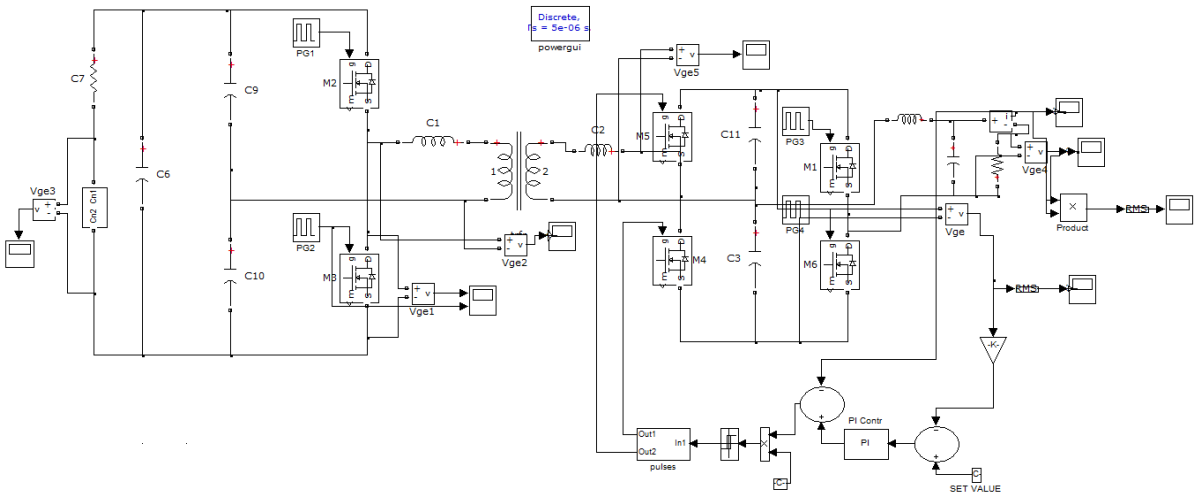

Fig 4.1 Closed loop without hystersis controller

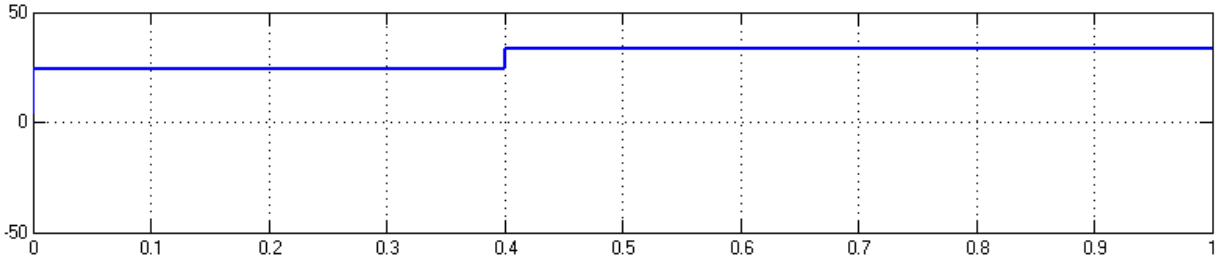

Fig 4.2 Input voltage

time

V_o

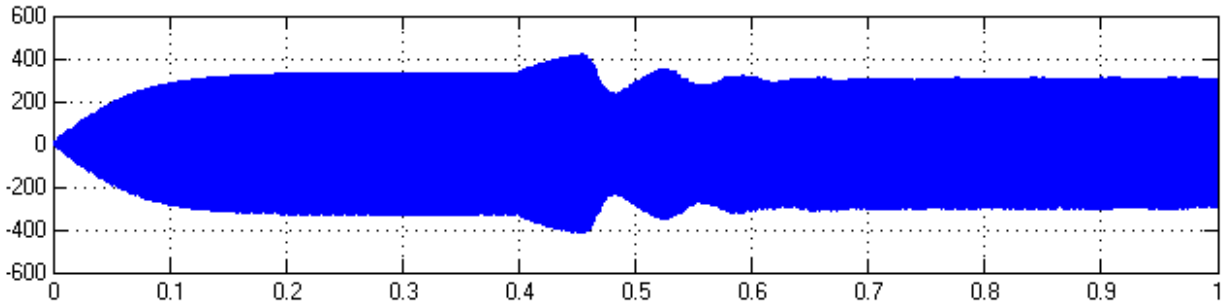

Fig 4.3 Output voltage

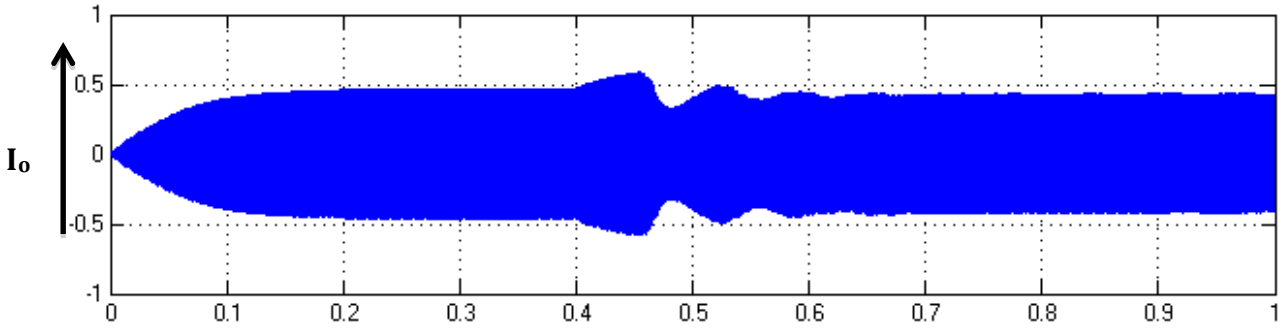

Fig 4.4 Output current

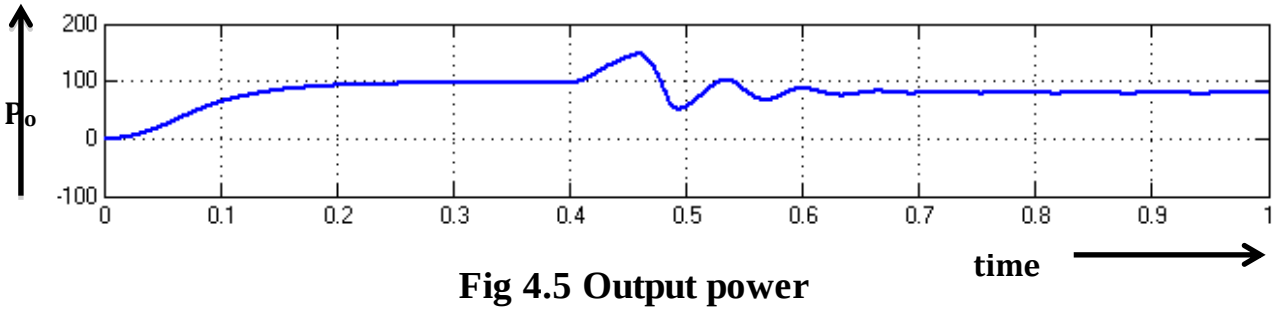

Fig 4.5 Output power

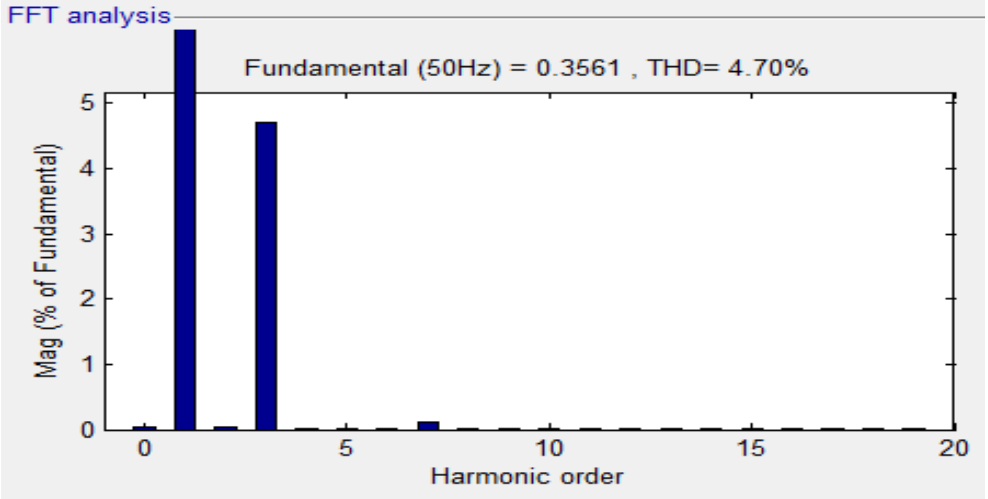

Fig 4.6 Output current THD

Table-1 Comparison of Time domain parameters

controller	Tr	Ts	Tp	Ess
PI controller	0.44	0.71	0.53	3.3
Hysteresis	0.42	0.62	0.43	1.1

Table-2 Comparison of THD content

Type of controller	THD
Without hysteresis controller	6.83%
With hysteresis controller	4.70%

CONCLUSION

DC to DC converter was combined with inverter to produce AC of good quality. DAB DC to AC converter system is modeled and simulated using the blocks of simulink. The results of closed loop system with and without hysteretic control depict that the THD content in output is reduced by 2.1% settling time is reduced by 10% and steady state error in output is reduced by 2.2v. The proposed system has advantages like low losses and stresses. The drawback of the proposed system is the requirement of high frequency devices and transformer.

The comparison of FLC and HC systems will be done in future.

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BIOGRAPHIES

R.Sowmyawas born in Madurai, Tamil Nadu, in 1981. She received the B.E. degree in Electrical Engineering from Thiagarajar college of Engineering, Madurai, in 1998 ,theM.E.degree in Applied electronics from College of Engineering ,Chennai,in 2008.She is presently a research scholar in Satyabhama University, Chennai. Her area of interest is DC-DC converters and Renewable energy conversion.

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