IMPLEMENTATION OF NEURO FUZZY 2^{ND} ORDER BOOST CONVERTER FOR HIGH STEP UP ELECTRIC TRACTION

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ABSTRACT—*The Novel method of experimental verification of high step up electric traction with 2^{nd} order boost converter. The converter switches are controlled by PWM technique . This type of traction system which improves the performance of electric traction. The neuro-fuzz converters produced minimum output voltage ripple and small settling time. This paper is simulated and controls the electric traction.*

1, INTRODUCTION

This conversation accept a DC input voltage and converts into output DC . In many DC applicants large outputs and output segregations is require to implement these type of system . The Neuro-fuzzy convertor is without conduction loss and voltage Ripple more efficiency is obtained from lesser power requirement . To reduced voltage ripple several method has been used Coupling of inductor, interleaved control scheme in dual buck boost convertor, voltage lift techniques has been proposed. But this type of convertor working in continuous conduction mode (CCM).The design of proposed convertor is simulated. This controller is implemented in PIC controller or FPGA. The existing traction has Clamp circuit is used to re circulate the energy. The voltage strain in rectifier is minimized and reverse-recovery problem is eliminated. The hardware unit utilizes embedded technology using PIC microcontroller16F84A to give gate pulses to the MOSFET converter switches.

In this proposed 2^{nd} order converter only four MOSFET's are controlled by Fuzzy logic and implemented in neural network used which reduces the number of devices and makes circuit simple in construction. Efficiency, size, and cost are the primary advantages of the proposed system. when compared to other existing converters arrangement will have an efficiency of about 97%, whereas existing converters are usually 80 to 85% efficient..The simulation result for a 40-V-to-600-V converter is simulated in open circuit and closed loop system. Simulated disturbance is applied at a time period of 0.7 micro second and noted that the output voltage is maintained constant always.

2, COMPARISON OF EXISTING SYSTEM WITH PROPOSED WORK

The general structure of 2^{nd} order converter is shown below which consist of four MOSFET switches S_{11}, S_{12}. S_{21} and S_{22} which is connected with four body diodes D_{11}, D_{12}, D_{21} and D_{22} respectively, two diodes D_{b1} and D_{b2}, two energy-transferring capacitors C_{b1} and C_{b2}, one output inductor L, and one output capacitor C, and a load resistor R.

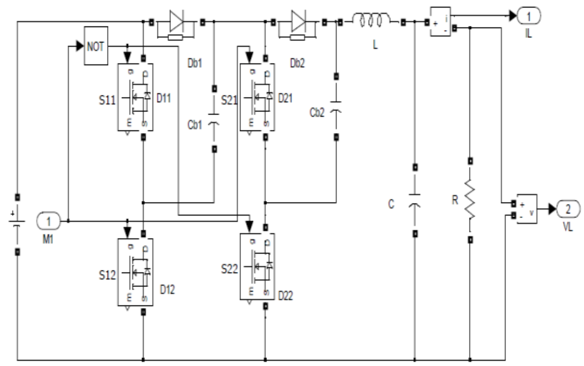

Fig. 1 – 2^{nd} order converter circuit

The Neuro Fuzzy Converter Is Shown Below

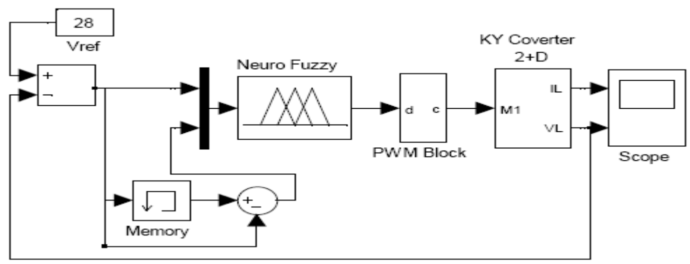

Fig. 2 – Neuro fuzz circuit 2^{nd} order converter

The output of waveform of this type of converter is

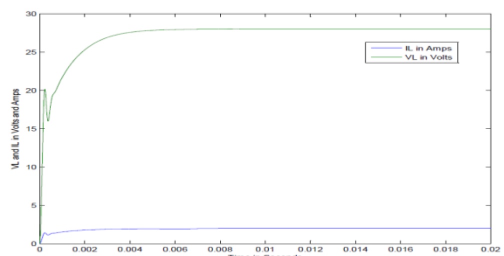

Fig. 3 – Output waveform for proposed method

The output of the converter for existing system is

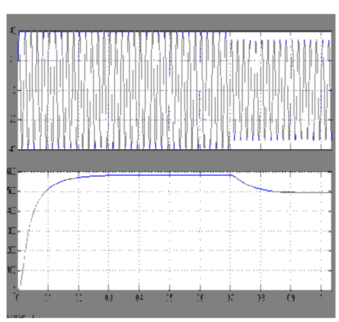

Fig. 4 – Output waveform

From the graph the settling time of the neuro fuzzy converter is less when compared with existing one, if implementation of this type of converter in traction which produce more efficiency

3, HARDWARE IMPLEMENTATION

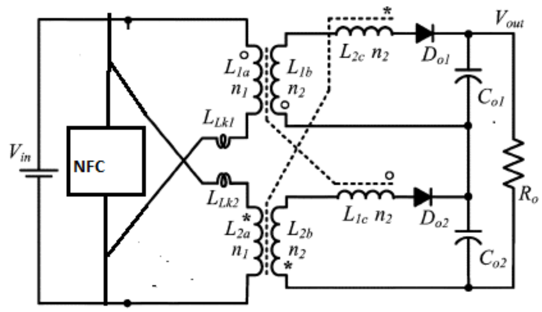

Fig. 5 – Circuit diagram of Electric traction

NFC is neuro fuzz logic converter. For the hardware implementation we use different components. PIC Microcontroller 16F84A for gating signals to the converter switches. Voltage Regulators for supplying desired voltages to PIC controller and driver IC's

- 7812 voltage regulator
- 7805 voltage regulator.

IC IR2110 is used for the amplification of the pulses given by PIC16F84A. Converter is implemented in Neuro fuzzy logic. High frequency ferrite core transformer is used in the circuit for high step-up applications. Diodes are used to get rectified dc output. Output capacitors are small in capacity which provides boosted voltage.

The surface view of neural architecture rule base after training by hybrid method is shown in Fig.6 .

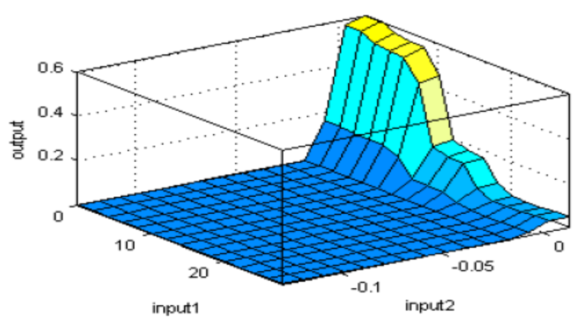

Fig. 6 – Surface view of neural architecture

4, CONCLUSION

The Neuro-Fuzzycontroller designed and simulated for a 2^{nd} order converter exhibit a reduced output voltage ripple and better settling time than the existing Fuzzy controller converter. The output voltage ripple is reduced from 200mV to 1.5mV and the reduced settling time is 7mS reduced from 25mS of the existing system. Thus the stability of the converter had been increased by the proposed Neuro-Fuzzy controller. This type of converter is implemented in electric traction to generate high efficiency and the output performance is simulated

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