Modeling and Simulation of Novel Isolated AC–DC Converter for Wind Farms using LLC Resonant Converter for Industrial Application in MATLAB
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ABSTRACT
In this paper wind turbine fed high efficiency ac to dc converter is proposed for industrial application (R, RL loads). A SIMULINK model is proposed with wind turbine and with a constant ac voltage source. An LLC resonant converter is also used in this circuit configuration to achieve the higher efficiency. Total circuit is implemented and simulated in MATLAB 2012a software.

Keywords: LLC resonant converter, wind generation

I. INTRODUCTION
In this project I am using The High-Efficiency Isolated AC–DC Converter Using the Three-Phase Interleaved LLC Resonant Converter Employing the Y-Connected Rectifier as a reference and the total project is developed by using MATLAB 2012a software for developing the circuit configuration,

![Block diagram](image)

Figure 1. Block diagram

Here in this circuit the total components are arranged and simulated in graphical user interfacing (GUI) environment. Here in this project we are getting input from wind forms and that is implemented using the elements in SIMULINK library and the output of that wind forms are connected to Bridgeless Power factor correction unit and that is also implemented using the elements and switches in SIMSCAPE library and that is again connected to LLC converter that is implemented using MATLAB library and finally we are connecting Industrial load and total simulation model is simulated using RUN option, so finally the outputs are observed by using the scope block in MATLAB library.

Basically in order to implement the ac to dc circuit, we need to have a model sheet in matlab 2012a software in that model sheet we need to arrange the ac voltage source and four control switches and their corresponding pulse generator resistance branch and scope measurement blocks as shown in the figure.
Pulse generators are the blocks used to generate the pulse signals to either ON or OFF the control switches. The below parameters are required to generate the pulse. So because of the above parameters the below two pulse signals are produced so that these signals are used to turn off and turn on the switches that are present in the ac to dc converter.

So figure 4 represents the pulse signals that is used to turn on and off the 1,2 switches and fig 5 represents the pulse signals that is used to turn on and off the 3,4 switches.

The above figure represents the total output voltage of ac to dc converter that obtained across the R load.

II. DC TO AC CONVERTER MODELLING

The matlab circuit for dc to ac converter is shown below the required elements are collected from the simscape library in matlab library window.

The above model is consisted of pwm generator for generating the pulse for dc to ac converter.
These are the parameters that are required to generate the pulse signal that are useful to operate the 2 arms 4 pulse signals.

The above figure shows the output current of the dc to ac converter at the R load.

The above figure represents the pulsating ac output voltage of dc to ac converter without any filter, so if want change the pulsating ac in to sinusoidal ac voltage waveform we need filter.

III. SIMULATION RESULTS

The below figure 9 represents the total matlab model of three level ac to dc converter with a constant ac voltage source and total circuit is operated with the controlling circuit proposed in the below sections that shows the importance of pulse generator and the controlling pulses are generated by the use of the these pulse generator.

In pulse generator generator block is can able to generate the pulse with different amplitudes and widths and different time period.
So every pulse generator is can change the total output. so that it is very important element in this controlling circuit.

Controlling circuit for the three level ac to dc converter with a constant ac voltage source is shown below

![Controlling circuit](image1)

**Figure 10.** Controlling circuit

Controlling pulses for the three level ac to dc converter with a constant ac voltage source is shown below

![Controlling pulses](image2)

**Figure 11.** Controlling pulses

Output voltage for the three level ac to dc converter with a constant ac voltage source is shown below

![Output voltage](image3)

**Figure 12.** Output voltage

Output current for the three level ac to dc converter with a constant ac voltage source is shown below

![Output current](image4)

**Figure 13.** Output current

The below figure represents the total matlab model of three level ac to dc onverter with the trditional wind turbines
Controlling circuit for the three level ac to dc converter with the traditional wind turbines is shown below.

![Controlling Circuit](image)

**Figure 15.** Controlling Circuit

The below figure represents Output voltage for the three level ac to dc converter with the traditional wind turbines is shown below.

![Output Voltage](image)

**Figure 17.** Output voltage

The below figure represents Output current for the three level ac to dc converter with the traditional wind turbines is shown below.

![Output Current](image)

**Figure 18.** Output current

**IV. CONCLUSION**

In this “A Novel High-efficiency isolated Ac–Dc converter For wind farms using LLC resonant Converter for industrial application” paper proposed converter for industrial application (R, RL loads) is simulated by using the MATLAB software. SIMULINK models are proposed and simulated successfully with wind turbine and with a constant ac voltage source. An LLC resonant converter is also used in this circuit configuration to achieve the higher efficiency. Total circuit is implemented and simulated in MATLAB 2012a software.
V. REFERENCES


