Design and Modeling Fuel Cell Operated GRID for Improved Power Quality

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ABSTRACT

This paper proposes the modeling of fuel cell fed isolated full bridge converter for grid application. and also a modeling of the dc source fed dc to dc converter is also discussed here in this paper and comparative analysis of two model are also discussed In this paper.

Keywords: Fuel Cell, DC To DCConverter, Grid Interconnection.

I. INTRODUCTION

In this paper a novel pulse width modulation scheme is proposed to control a bidirectional converter. As the dependency on the non-renewable energy sources is increased and the environmental concerns are illuminated, research on zero emission energy sources such as fuel cell has been intensified. The transition from the present fossil fuel based economy to a self-sufficiency clean energy world depends upon distinctive power electronic systems for the implementation of alternative energy grid interface. Fuel cell technology is an attractive means of power generation because it is environmentally clean, uses the vast resource of hydrogen as fuel and approximately doubles the current cycle efficiency of fossil fuel power generation. In this project we are giving the input from the fuel cell, and so that energy is fed to the bidirectional dc to ac converter so ac output voltage is our output so that is given to the single phage transformer which is available

In the MATLAB SIM POWERSYSTEM library and the output of this transformer is given to the ac to dc bidirectional converter and rectifier output is fed to the final dc electrical grid.
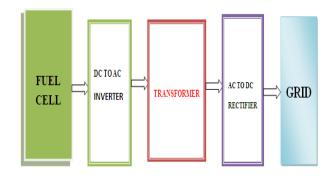

Figure 1. Single line diagram of proposedsystem

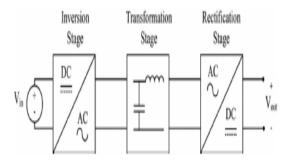The following figure shows the architecture of the conventional system fed by the dc source

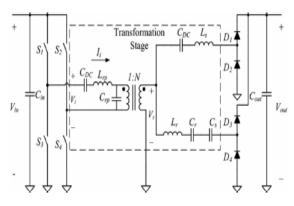**Figure 2**. Architecture of conventional system

Figure 3.topology of conventional system

II. DC TO AC CONVERTER

The matlab circute for dc to ac converter (fully controlled) is shown below the requied elements are collected from the simpower system library in matlab library window
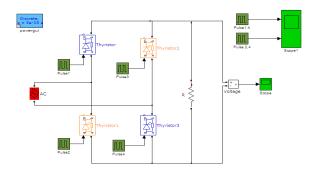

Figure 5. Modeling of DC To Ac Converter

Pulse genarators are the blocks used to genarate the pulse signals to either ON or OFF the control switches. The below parameters are reuired to genarate the pulse.

So beacause of the above parameters the below two pulse signal are produced so that these signal are used to turn off and turn on the switches that are present in the dc to ac converter.
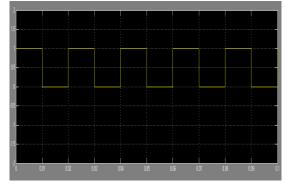

Figure 6. Gate Signal For 1,2 Switches

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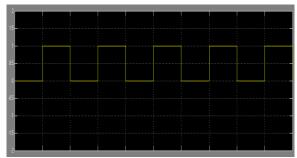

Figure 7. Gate Signal For 3.4 Switches

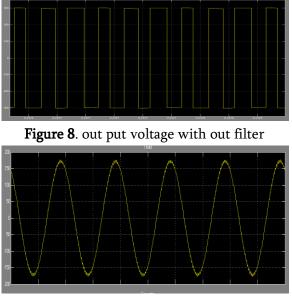**Figure 8**. out put voltage with out filter

Figure 9. out put voltage with filter

The above two figure represents the total output voltage of Dc to Ac converter that obtaiend across the R load with and with out filter .

III. DC TO THREE PHAGE AC CONVERTER

The matlab circute for dc to ac converter (three phage fully controlled) is shown below the requied elements are collected from the simpower system library in matlab library window
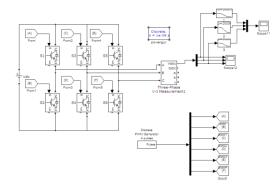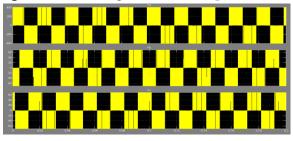

Figure 10. Modeling of DC To Ac(3p) Converter

Figure 11. out put voltage with out filter

The above figure represents the total output voltage of Dc to Ac converter that obtaiend across the R load with out filter .
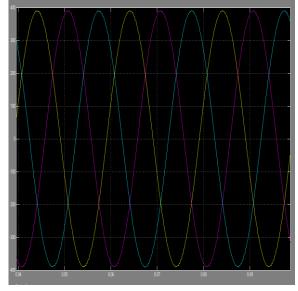

Figure 12.out put voltage with filter

The above figure represents the total output voltage of Dc to Ac converter that obtaiend across the R load with filter .

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 contol switches and their corresponding pulse genarater resistence branch and scope measurement blocks as shown in the figure
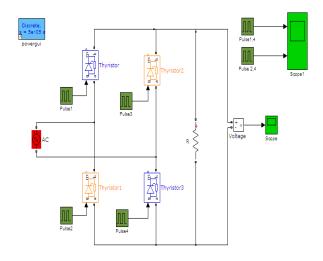

Figure 13. Modeling of Ac To Dc Converter

Pulse genarators are the blocks used to genarate the pulse signals to either ON or OFF the control switches. The below parameters are reuired to genarate the pulse.

So beacause of the above parameters the below two pulse signal are produced so that these signal are used to turn off and turn on the switches that are present in the ac to dc converter.
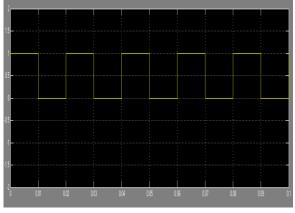

Figure14. Gate Signal For 1,2 Switches

So figure14 represents the pulse signals that is used to turn on and off the 1,2 switches and figure 15 represents the pulse signals that is used to turn on and off the 3,4 switches
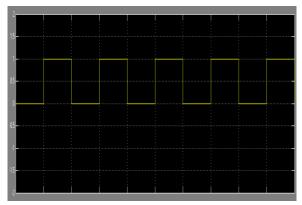

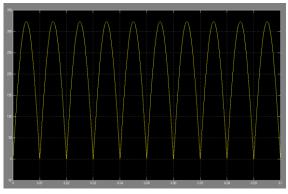Figure15. Gate Signal For 3.4 Switches

Figure 16. Output For Ac Top Dc Converter

The above figure represents the total output voltage of ac to dc converter that obtaiend across the R load.
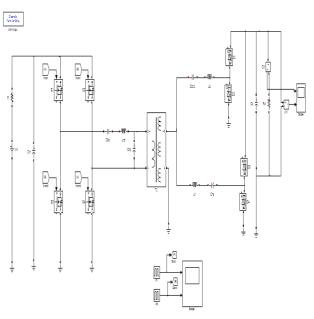
IV. SIMULATION RESULTS

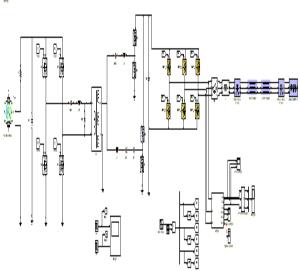Figure 17. MATLAB SIMULINK model of conventional model

Figure 18.proposed system modeling

V. CONCLUSION

Isolated full-bridge converter for grid application is simulated by using the MATLAB software. SIMULINK models are proposed and simulated successfully with fuel cell and with a constant dc voltage source. Total circuit is implemented and simulated in MATLAB 2012a software.

VI. REFERENCES

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