SIMULATION AND MODELLING OF 9-LEVEL MLI

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Abstract: In this research 9-level MLI modelling and simulation is done. Impact of increasing level of Inverter circuit is also analysied. MATLAB Simulation is done for testing the 9-level inverter circuit for 3rd Harmonic injection and its impact evaluation

Introduction:

Multilevel Inverters produces smother output which is very near to sinusoidal waveform. Nine level diode clamped inverter modelling is shown in figure 1. This modelling is done using MATLAB, having 8 switches both in upper and lower leg of the circuit clammed with diode, due to this it is termed as Diode clamped configuration. Figure 2, shows this Diode clamped modelling arrangement.

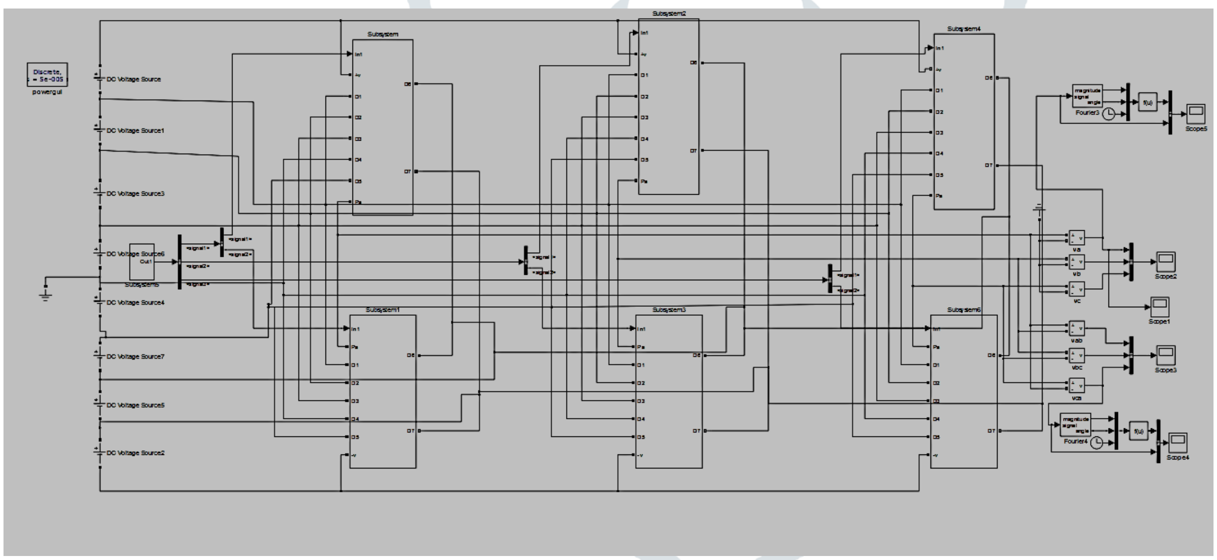

Fig. 1 Simulink model of a 9 level diode clamped MLI

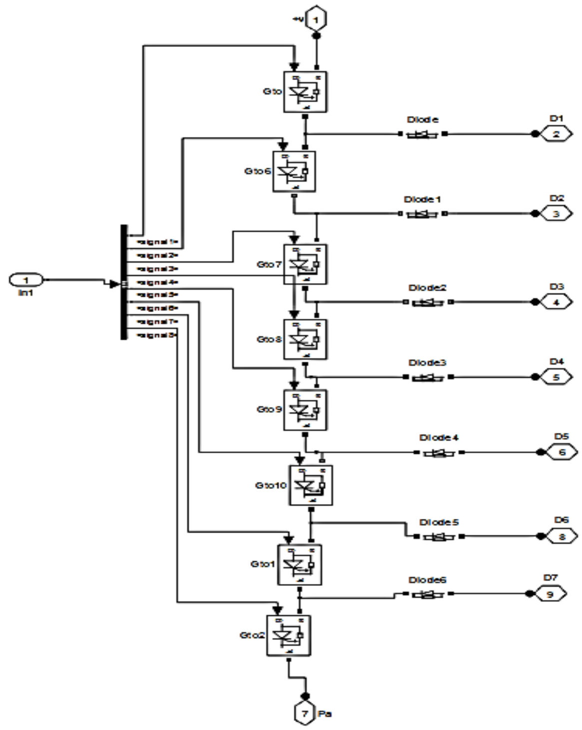

Fig.4.2 subsystem for one leg of 9 level DCMLI

Modelling of 9, Level MLI

Since it is 9-level modelling having eight autonoumsly operated DC voltage source and three branches two having eight switched leg and third one is clamping diode, to generate 9-level in voltage waveform.

Carrier based modulation scheme is utilized for firing the inverter switches, in this carrier wave form is triangular in shape also eight different carrier wave are used. Here third harmonic injection technique is used for reduction of the harmonics in the output, this factor is used here to adjust the switching based on 3rd Harmonic to reduce harmonics. Figure 3 shows the subsystem.

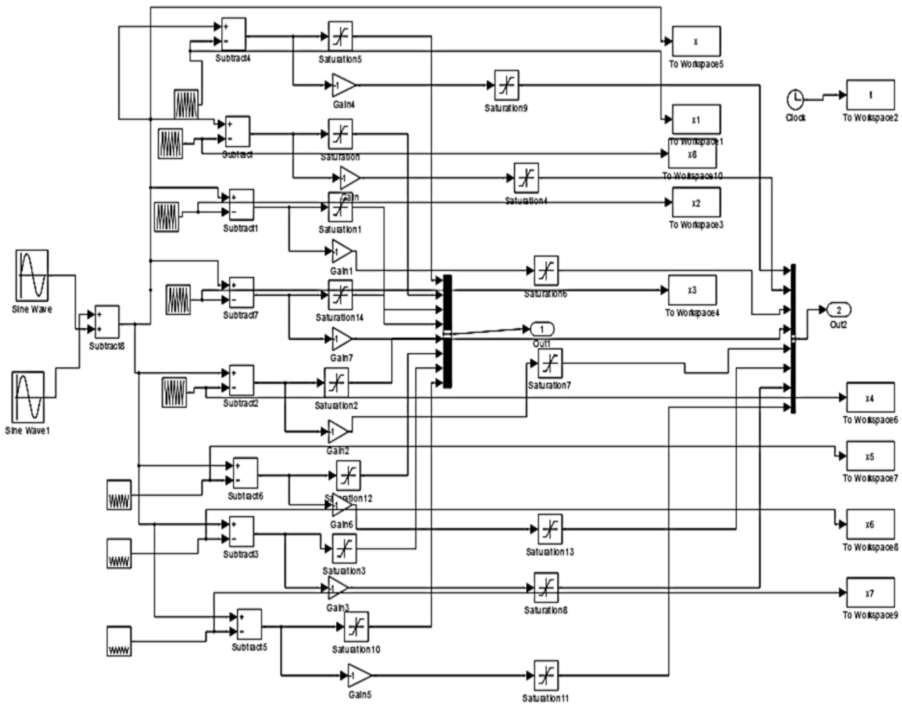

Fig4.3 subsystem for implementation of proposed scheme

Modulation index varies from 0 to 1 with sinusoidal reference waveforms.

Modulation Index = $\frac{f_c}{f_r}$

Here modulation index is taken as 50. Third harmonic injection is also having variable amplitude this govern the variable change in parameter to be controlled real-time. Here K is magnitude of third harmonic which is injected to the system. Different indexing method which affect the modulation.

1. Amplitude modulation index
2. Frequency modulation index
3. Different value of K.

Figure 4 & 5 shows the impact of 3^{rd} harmonic injection at different value of K i.e. at 0.5 & 0.25. Here nine level of waveform is shown as nine steps, where at zero level transition its carrier signal is not present due to this only eight steps are shown.

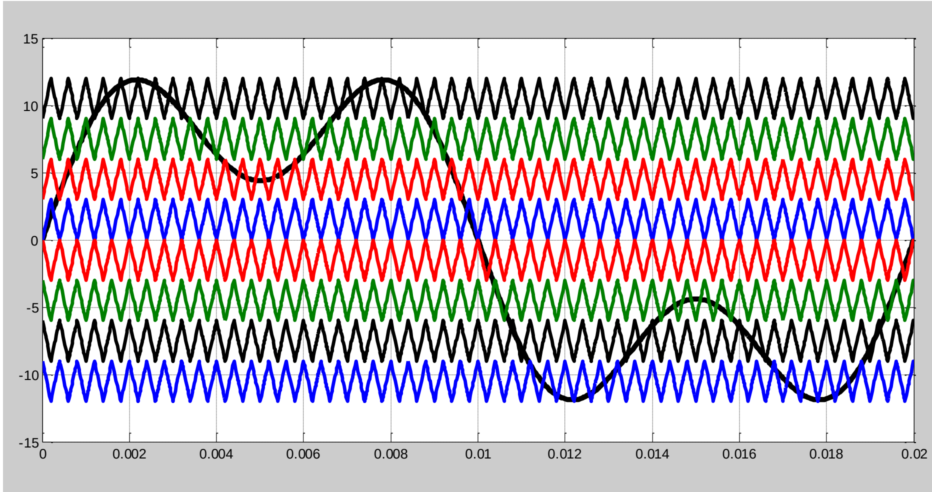

Fig.4. Third harmonic injection modulation scheme for K=0.5

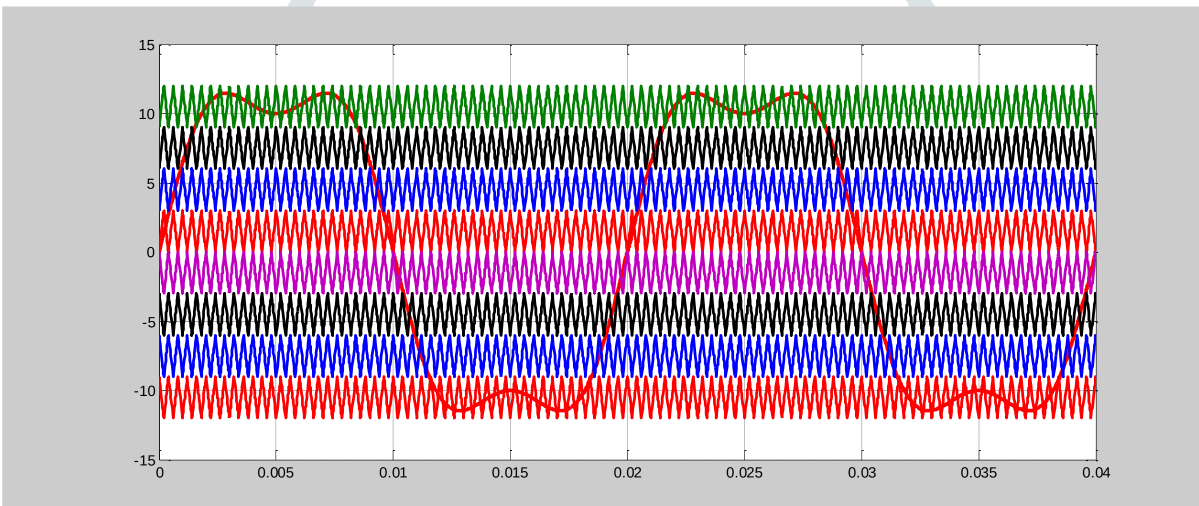

Fig.5. Third harmonic injection modulation scheme for K=0.25

Conclusions

This research work present simulation and modelling of 9 level diode clamped MLI. Also with different value of K output waveform is shown. Thus 3rd Harmonic injection impact is also investigated.

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