Abstract:
Paper introduced one module for asymmetrical multilevel inverter to produce 13 levels by two DC sources. The proposed multilevel is designed based on two back to back T-Type modules with some switches around them. The proposed module is named K-Type. The configuration of K-type provides two extra DC links by capacitors (as the virtual DC supply) to achieve more levels to create staircase waveform. The module needs lower components including two DC sources, two capacitors, 14 semiconductors. It can be used in power applications with unequal DC sources (with ratio 1:2). It can also be easily modularized in two strategies in cascade arrangements to form high voltage outputs with low stress on semiconductors and lowering the number of devices. This ability can be used in some special applications such as solar farm along with a lot of DC sources. DC sources can also have different voltage amplitudes. In the conventional methods, it should be considered one inverter for each DC resources and fix the output voltage the same amplitude. It increases complexity and losses from this aspect, but in asymmetrical multilevel converters, it is possible to combine some DC resources together and generate a unique AC output. It reduces the number of separated inverter, components, losses and etc.

I. INTRODUCTION

Multilevel inverters (MLIs) are mainly used in power electronics area. Due to its reliable operations and it can also generate output voltage extremely with low distortion and it also providing high quality voltage source converters(VSC) which is used to connect the DC power system to the AC power system.

Now-a-days the new reconfiguration spreads widely in power system area. New hybrid type topologies are proposed as another MLIs which are assemble using reduced switch count used to achieving maximum Extended H bridge with two different amount of DC sources. To reduce the stress on switches higher rate of semiconductor devices are needed to avoid switching losses. By avoiding stress on switching more output voltages level can be achieved by some DC sources. In some cases capacitors are redesigned to remove some DC links. And capacitors are used to creates more different staircase waveforms. The Multi level inverter is act like an inverter and it is used for industrial utilization as alternative in medium voltage situations and also in high voltage situations.

In traditional method many power electronics semiconductor devices are collaborate together to produce a high frequency staircase waveforms. It increases more complications and losses from this aspect, but in asymmetrical module multilevel converters, it is possible to combine some DC resources together and generate a unique AC output. It reduces the number of separated inverter, components, losses, stress on switch and etc. A dc source generates one level by two switches in and makes one module together. The module can be connected in series to generate more positive levels. On the other side, all levels are positive levels then it needs an extra circuit to generate negative levels. H-bridge is used as additional circuit and it is added to the series modules in for staircase sinusoidal waveform (negative and positive half-cycles).

1. EXISTING SYSTEM
In existing system it is considered as one inverter for each separate dc sources this increases complexity and losses. In conventional method it fixes the output voltage same amplitude.

2. PROPOSED MODULE
Proposed system is an arrangement of semiconductor with mixed DC sources and capacitors as DC links to achieve maximum voltage levels from DC sources which improves economic implementation cost and power quality. This module uses just two unequal DC sources with the amount of 1VDC and 2VDC to generate 13 output voltage levels. In this module there are 6 positive levels, 6 negative levels and zero level (totally 13 levels ). A suitable designing of power converter can achieve maximum output levels from two DC sources. This configuration generates six positive levels, six negative levels and zero level (13 levels totally). The shape of proposed topology is similar to Kite and it is named “K-Type” (Kite Type). It is noticeable that DC source with 1VDC charges the capacitor with 1VDC, and DC source with 2VDC charges the capacitor with 2VDC without any additional circuit.
3. OPERATING PRINCIPLE
The input voltage to the driver circuit and PIC microcontroller is produced by auto transformer. The rectifier used in the project is bridge rectifier. The diode D2, D3 are ON state and diode D1, D4 are on OFF state during the period t=0 to t=T/2 and vice versa during the period t=T/2 to t=T. Thus the polarity across the load is same as MOSFET is used in the project which is designed in such a way that it is directly driven from the output of PIC microcontroller. The MOSFET is used as switch. When the gate is connected to ground it is turned off and when the gate is connected to 5V it is turned on. In order to obtain a DC voltage of 0Hz, a low pass filter is used. DC voltage across the filter has negligible ripple in the waveform, then the DC voltage is fed to load driver circuit gives triggering pulse to the switches. It gives 5 to 12 volts. The PIC microcontroller used is PIC 16F877A which produces switching pulses to inverter. The microcontroller is driven by driver circuit to boost triggering voltage to 9 volts. Isolator prevents PIC microcontroller from damages provided by direct passing of 230 volts supply. The output waveform has 13 level 6 positive level, 6 negative level and zero level. During 1VDC the switches S1, S8, S9 were on. Switch (S1, S7)(S3, S8)(S5, S9) are not turned on at the same time to prevent short circuit between two DC sources. On six positives level the switches are sequentially turned on during 2VDC the switches S7, S8, S3 were on. During 3VDC the switches S1, S3, S8, and S9 were on. During 4VDC the switches S1, S4, S8, S9, S10, S11 were on. During 5VDC the switches S4, S5, S7, S10, S11 were on. During 6VDC the switches S1, S4, S5, S10, S11. Similarly on six negative levels the switches are sequentially turned on during -1VDC the switches S3, S5, S7 were on. During -2VDC the switches S1, S3, S9 were on. During -3VDC the switches S3, S7, S9 were on. During -4VDC the switches S1, S3, S6, S7 were on. During -5VDC the switches S2, S3, S10, S9 were on. During -6VDC the switches S2, S3, S6, S10, S11 were on. The capacitor charging and discharging takes in zero level. The capacitor being charged for each half cycle. For 1VDC the capacitor charging path is S1, S2, S4, S11, S8, and the capacitor charging path for 2VDC is S4, S5, S6, S8, S10.

5. SIMULATION OUTPUT

II. CONCLUSION

Paper introduced a new arrangement module for proposed module to provide staircase waveform in which the capacitor is used as the DC links. This arrangement of multilevel converter will posses only a lower number of DC source. It can be resulted in 13 level with less DC sources. The proposed module of multilevel inverter provides 13 levels with two varying DC sources (2VDC and 1VDC). It also have two chargeable capacitor and 14 semiconductor switches. The capacitor can be charged by itself without any circuit. It can be used in many applications due to the presence of less parts. The module is arranged as two back-to-back T-type inverters. Also it can be brought together as cascade modular which put to a modular topology with more voltage levels at higher voltages. Nearest level of control switching modulation (NLC) arrangement is put to achieve high quality sinusoidal output voltage.

III. REFERENCE


