**ABSTRACT**

Inverts of pv system based distributed generators are often subjected to wide changes in the inverter input voltage, which is either above or below the output ac voltage, thus demanding a buck-boost operation of inverters .

Many traditional full-bridge inverters and single-stage buck-boost inverters either have complex structure or have limited range of input dc voltage.

In this paper a single phase transformer less inverter topology is implemented that can operate over a wide input voltage range making it suitable for distributed generation applications.

This topology of the inverter has multiple stages and uses six switches. Depending on the reference value set ,the inverter output voltage can be either boosted or bucked with respect input voltage.

**TABLE OF CONTENTS**

**Chapter Page No**

**1 INTROUDUCTION**  [01-02]

1.1 Distribution Generationsystems

**2** **DESCRIPTION ABOUT DG SOURCE ELEMENTS** [03-20] 2.1 Solar panels

2.2 Fuel cells

2.3 Wind power

2.4 Photovoltaic system

**3**  **BUCK-BOOST CONVERTER** [21-28]

**3.1** Classicification of dc choppers

3.2 Circuit diagram

3.3 Operation

3.4 Waveforms

**4** **INVERTERS**

4.1 Classification of inverters

4.2 Single phase full bridge inverter

4.3 Pulse amplitude modulation [29-49]

**5 SIMULATION**

5.1Blockdiagram 50

**6 MATLAB SIMULATION** 51

6.1 Matlab circuit for proposed circuit

**7 RESULTS** [52-53] **8 CONCLUSION** 54 REFERENCES [55-56]

**LIST OF FIGURES**

**Fig No**:

**Pg. No**:

2.1: Solar Panel System 3

2.4.1: PV effect converts the photon energy into voltage across the pn 10

junction

2.4.4: Basic construction of PV cell 14

2. 4.5: The pv array set up 15

2.4.6 Structure of a model Solar Cell 16

2. 4.7: Construction of PV module: (1) frame, (2) weatherproof junction 17

2.4.8: PV cell equivalent circuit 17

2. 4.9: Power-Voltage (PV) Characteristic of a Photovoltaic Module 19

2.5: Variation of P-V Characteristics of Photovoltaic Module 20

3.1.1: Step‐down Chopper with Resistive Load 22

3.1.2: Step-down choppers — output voltage and current waveforms 23

3.2.1: Step up chopper 25

3.2.3: Buck-boost converter circuit diagram 27

3.2.4: Current and voltage waveforms of buck-boost converter 28

4.2.1 Block diagram of H-bridge Inverter 30

4.2.2. Operational diagram of H-Bridge inverter 31

4.2.5.1: Single phase full bridge inverter 33

4.2.7: Wave forms 34

4.3.1: 2-Level PWM Comparison Signals 39

4.3.2.1: 2-Level PWM Output (Unfiltered ) 40

4.3.2.3: 2-Level PWM Harmonic Analysis 41

4.3.3: Simulated 3-Level PWM Output (Filtered) 43

4.3.4: 3- Level PWM Harmonics Analysis of Unfiltered Output 43

4.3.4.1: 5-Level PWM Comparison Signals 45

4.3.4.2: PWM Bridge Control Signals (superimposed) 45

4.3.4.3: 5-Level PWM Output (unfiltered) 46

4.3.4.4: 5-Level PWM Output (filtered) 46

4.3.4.5: 5 -Level PWM Harmonics Analysis of Unfiltered Output 47

4.3.5.1.: Filtered Outputs ma 0.1 to 0.95 48

5.1: Block diagram of proposed Buck-Boost single phase VSI for Distribution Generation system 50

**ABBREVIATIONS**

* DC Direct current
* AC Alternating current
* SCR Silicon controlled rectifiers
* KVA Kilo volt ampere
* PWM Pulse Width Modulation
* VAR Volt ampere rating
* THD Total harmonic distortion
* IGBT Insulated Gate Bipolar Transistor
* IGCT Insulated Gate Commutated Thyristor
* SVC Static Var Compensator
* STATCOM ­­­­­­­­­­­­­ Static Compensator
* HVDC High voltage direct current
* GTO Gate-Turn-off Thyristor
* VSI Voltage source inverters
* PID Proportional integral differential controller