MULTILEVEL INVERTER BASED ON SWITCHED-CAPACITANCE STRUCTURE

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INTRODUCTION

- Recently, multilevel inverters (MIs) are getting more attention from researchers because of advantages like better waveform quality, lower EM noise, and lower device stress.

- MIs are used to couple a DC source to an AC bus for applications like electric motor drivers, uninterruptible power supplies, and distributed generation systems.

EXISTING SYSTEM(Problem identification)

The following topologies are now used in practice:-

- Neutral-point clamped (Diode clamped)
- Flying capacitor
- Cascaded H-bridge (CHB)

Disadvantages:
- Large number of components(switches, power supplies, capacitors, and diodes)
- Large size and high cost
- Complex control.

For low-power applications, the system size and cost are the main concerns

PROPOSED SYSTEM

- Switched-capacitor (SC) structure is added to the H-bridge inverter .

- The SC structures use capacitors, switches, and diodes to create a multilevel DC voltage at the DC bus of the H-bridge circuit.

- H-bridge circuit inverts the multilevel DC voltage to AC voltage.

| UNREGULATED DC | → | SWITCHED CAPACITOR STRUCTURE | → | MULTILEVEL DC | → | H-BRIDGE | → | REGULATED AC |

PROPOSED SYSTEM(Advantages)

Compared to conventional topologies, the proposed system has the following advantages:-

- Boost operation without magnetic elements.
- Fewer components(switches, sources & capacitors)
- Smaller & less expensive.
- Less complex control.
- Requires only one power DC source

For low-power applications, the system size and cost are the main concerns

SPECIFIC REQUIREMENTS

◉ **Hardware Requirement** :-

- · DSO (Analysis)
- · DSP (controller)
- · Function generator (Analysis & reference)

◉ **Software Requirement** :-

- · MATLAB (Simulation)
- · Proteus (Design)
- · Tex studio (Documentation)

EXPECTED OUTCOME

- Literature survey
- Mathematical model of SCMI
- Design of 350W SCMI
- Simulation studies
- Prototyping
- Performance Analysis
- Improvements
- Documentation

PROJECT PLAN

SEMESTER VII

➢ **PHASE I**
- Problem identification(October 2018)
- Formulating the Objective of the Project(October 2018)

➢ **PHASE II**
- Literature Survey(November 2018)
- Modelling(November 2018)

SEMESTER VIII

➢ **PHASE I**
- Design of Proposed System and simulation study(January 2019)
- Prototyping(February 2019)

➢ **PHASE II**
- Performance Analysis and Improvements (March 2019)
- Conclusion and Documentation (March 2019)

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[2] Barry W Williams, "Principles and Elements of Power Electronics Devices, Drivers, Applications, and Passive Components", 2006, ISBN 978-0-9553384-0-3

[3] Yuanmao Ye, K. W. E. Cheng, Junfeng Liu and Kai Ding, "A Step-Up Switched-Capacitor Multilevel Inverter With Self-Voltage Balancing", *IEEE Trans. Ind. Electron*, Vol. 61, No. 12, December 2014

[4] Bhagyalakshmi P S, Beena M Varghese and Dr. Bos Mathew Jos, "Switched Capacitor Multilevel Inverter With Different Modulation Techniques", *International Conference on Innovations in information Embedded and Communication Systems*, 2017