VARYING CARRIER BASED PULSE WIDTH MODULATION TECHNIQUE FOR MULTISOURCE INVERTER SYSTEM

IITM Technology Available for Licensing

Problem Statement

- Two-stage power converter systems, involving both DC-DC converters and inverters, are complex and expensive compared to simpler single-stage systems.
- Existing maximum power point tracking (MPPT) techniques, like perturb and observe (P&O), suffer from inefficiencies due to oscillations around the maximum power point (MPP).
- Parallel connections of photovoltaic panels increase conduction losses and are restricted by differing voltage ratings, while series connections necessitate multiple converters, raising component count and cost.

Intellectual Property

- IITM IDF Ref. **1922**
- **IN 466107 - Patent Granted**

Technology Category/ Market

Category - Photovoltaic Systems and Power Electronics, Electronics & Circuits
Applications - Solar Power Systems, Microgrids, Electric Vehicle Charging Stations
Industry - Renewable Energy, Automotive and Transportation

Market- The Maximum Power Point Tracking Charge Controllers Market is expected to grow at a **CAGR of 10%** from 2024 to 2031.

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

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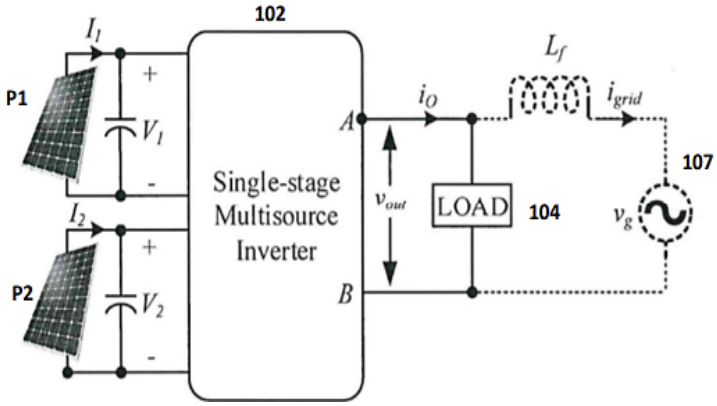

FIG 1. Shows an exemplary block diagram of a system illustrating photovoltaic fed single stage multisource inverter.

Technology

The invention provides a method for maximum power point tracking (MPPT) in photovoltaic-fed single-stage multisource inverters by determining and comparing reference voltages for multiple photovoltaic panels to optimize power extraction and efficiency.

It introduces control parameters (first and second) that measure differences between actual and reference voltages, using these to generate pulse width modulated gate signals for semiconductor switches, thereby optimizing power delivery to the load or grid.

The system employs a varying carrier-based pulse width modulation (PWM) technique to manage the connection and current supply duration of each photovoltaic panel, enhancing the inverter's overall performance and power extraction capabilities.

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Key Features / Value Proposition

1. Enhanced Power Efficiency:

- Maximizes power extraction from photovoltaic panels using advanced MPPT techniques, ensuring optimal energy conversion.

2. Cost Reduction:

- Simplifies system architecture with single-stage multisource inverters, reducing component count and overall system costs.

3. Innovative Control Parameters:

- Utilizes first and second control parameters to precisely regulate voltage levels and optimize power delivery.

4. Dynamic PWM Modulation:

- Employs varying carrier-based pulse width modulation (PWM) to efficiently manage current supply duration for each panel.

5. Improved Performance Stability:

- Minimizes oscillations around the maximum power point (MPP) with sophisticated voltage comparison methods.

6. Scalability and Flexibility:

- Supports multiple photovoltaic panels with series connections, offering scalable and flexible solutions for high-power applications.

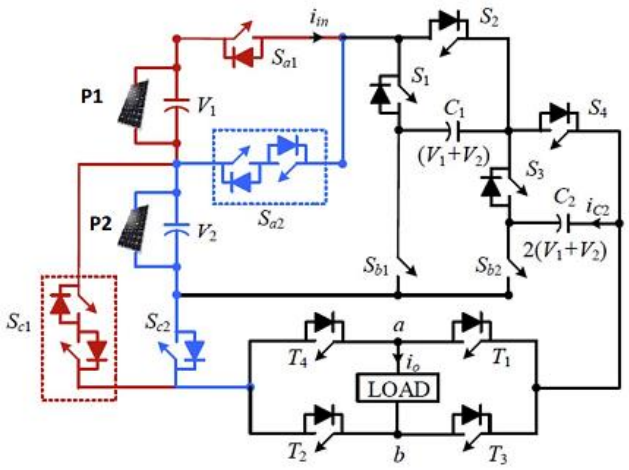

FIG. 2 (a) illustrates an exemplary topology used to implement the MPPT technique for a photovoltaic fed single-stage multisource inverter.

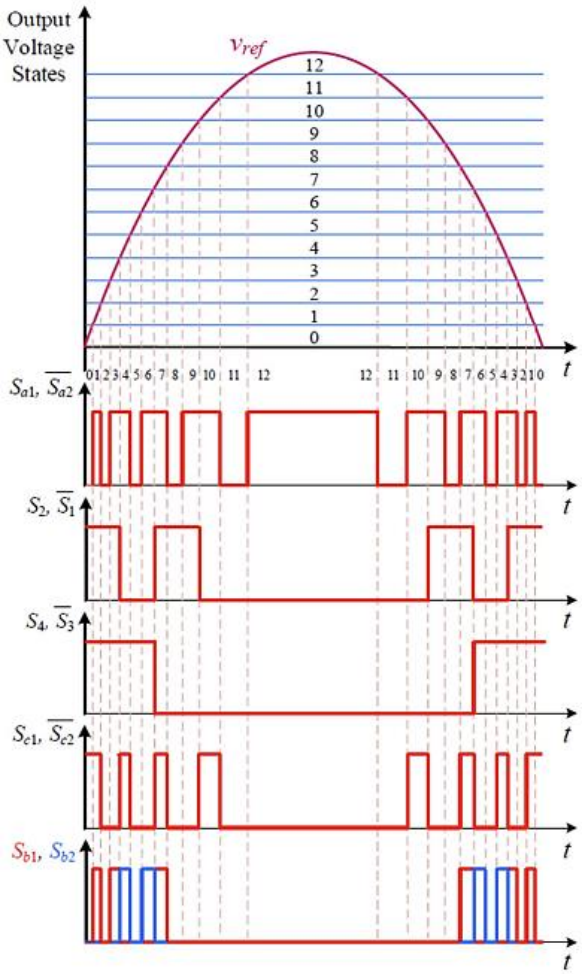

FIG. 2 (b) illustrates a pulse generation scheme based on the MPPT technique.

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