



University of Central Florida

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Maximum Power Point Tracking: Direct Frequency Modulation in Resonant Converters

Maximum power point tracking (MPPT) is an essential technique used to harvest photovoltaic (PV) power within various environments. Due to their effectiveness and ease of use, perturb and observe (P&O) algorithms are the most commonly used for MPPT. However, with its fixed perturbation increments, conventional P&O is difficult to balance the tracking speed and oscillation requirements. Adaptive P&O techniques are based on duty-cycle modulation for conventional pulse width modulation (PWM) power converters and are suggested to remedy these issues. Currently, there are no MPPT methods that deal specifically with frequency modulation.

UCF researchers have invented a variable MPPT method that overcomes the limitations of conventional P&O algorithms. This method can be used with resonant power converters that have various power frequency curves which can be distorted by conventional MPPT algorithms. Compared to previously known MPPT methods, this invention is faster, simpler, and more reliable. Additionally, the inventors have created a resonant power converter prototype to be used along with the MPPT algorithm.

Technical Details

A center points variable frequency iteration adjusts the switching frequency of a resonant power converter paired to receive power from a variable output power source. Built to implement the variable MPPT, an LLC resonant power converter prototype contains the following components: a DC/DC converter section that includes power semiconductor switches with an input for receiving electrical power, a resonant circuit that contains an input paired to an output of the DC/DC converter section, and a processor paired to the input drivers that are paired to control inputs of the power semiconductor switches. This processor is programmed to implement the MPPT algorithm.

UCF Inventors

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Benefits

- Higher accuracy
- Faster tracking speed
- Simple to use
- Direct adjustment of frequency
- Able to perform soft switching for a large range of input voltages

Applications

- Frequency modulated converters
- Resonant converters
- Power generation systems
- Micro inverters

Tech Fields

Solar and Thermal
Power Conversion

Keywords

maximum power point tracking, MPPT, perturb and observe, P&O, photovoltaics, resonant converters

Patent Pending

If you or your company are interested in this opportunity, Contact:

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