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Transformer-Less, Reduced Volume PV Inverter Topology

Inverters are devices typically used in solar power generation systems to convert electric current to a more useful type, but are prone to failure and are the main cause of malfunction in solar power systems. Using transformer-less (TL) inverters is a desirable alternative because of their higher efficiency, lower size, and lower cost. However, TL inverters frequently face electromagnetic interference and bulky capacitors must be used to address this issue. The high volume of these capacitors decrease the power density of the system and reduce the efficiency. Therefore, scientists are now looking to design a TL inverter topology with increased power density and reduced volume.

Researchers at ASU have developed a transformer-less PV inverter topology with improved power density and reduced volume. By decreasing the number of semiconductor switches and using a special type of capacitor (film capacitor), the reliability and power density has increased. The film capacitor enables operation under small capacitance values, reducing the volume of the system. In summary, scientists have created an inverter circuit design without relying on a transformer that has reduced volume and increased efficiency.

Potential Applications

- Solar Energy
- Power Generation and Electronics
- PWM Converters
- PV Inverters

Benefits and Advantages

- Simplified Topology – Reduced number of components allows easier control of the circuit design
- Smaller – Topology allows high voltage of DC link capacitor thereby reducing the volume of decoupling capacitors
- Efficient – Smaller passive components in PV inverters resulting in higher power density

For more information about the inventor(s) and their research, please see:

Dr. Raja Ayyanar's directory webpage