Dual Bridge Matrix Converter for AC to AC Power Conversion

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a novel dual bridge matrix converter.

**OVERVIEW**

A variety of circuit topologies using solid state switches have been developed to convert AC power at one frequency to AC power at another. One type of topology, known as the matrix converter, directly converts AC to AC, rather than AC to DC to AC as in many conventional converters.

Matrix converters hold many advantages, including an adjustable input power factor, bi-directional power flow, high-quality power output waveforms and the potential for a more compact product because they don’t require a large energy storage compartment, such as a DC bus capacitor. Despite these benefits, however, the matrix converter hasn’t been adopted by industry. This is mainly because the conventional modulation algorithm for these converters requires a complex and difficult pulse width modulation (PWM) switching strategy that is prone to commutation failure.

**THE INVENTION**

UW-Madison researchers have developed a novel dual bridge matrix converter that solves the commutation problems typically seen with conventional matrix converters. These new dual bridge converters possess the same characteristics as conventional matrix converters, including four-quadrant operation, a unity input power factor and high-quality voltage and current waveforms.

**APPLICATIONS**

- Direct conversion of AC power at one frequency to AC power at another frequency

**KEY BENEFITS**

- Eliminates the commutation problems seen with conventional matrix converters
- Applicable to three-phase induction motors less than 5 MW
- Allows the number of switches and the complexity of the clamp circuit to be reduced, thereby trimming costs
- Eliminates need for a large energy storage compartment, such as a DC capacitor, allowing easy integration into motor electronics

**ADDITIONAL INFORMATION**

**Tech Fields**
Engines & Power Electronics - Power converters

**CONTACT INFORMATION**

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867.