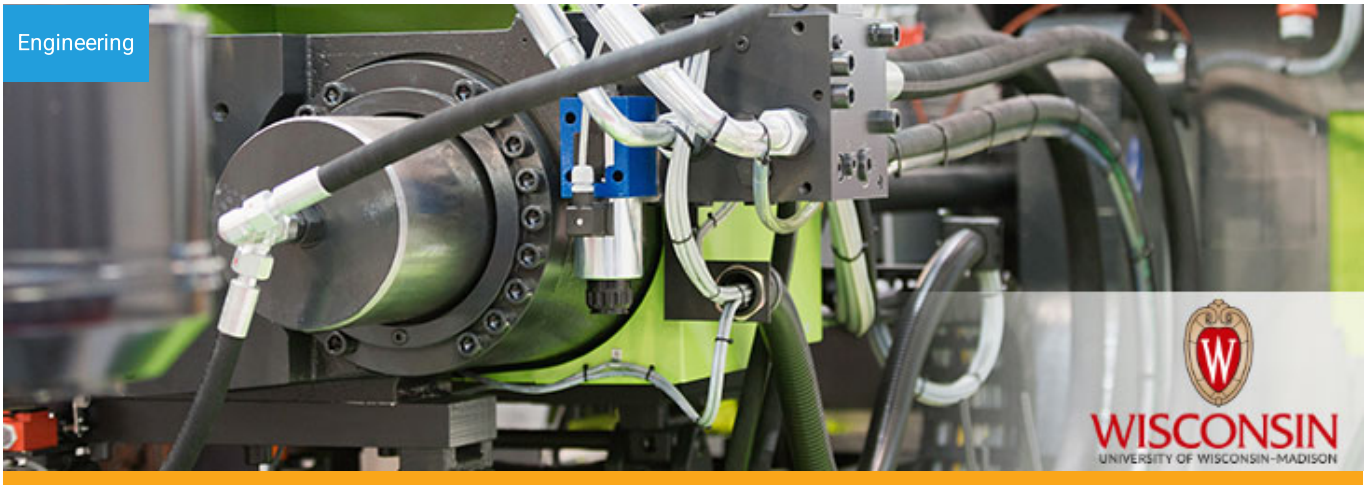
Engineering



CURRENT SOURCE INVERTER USING BIDIRECTIONAL SWITCHES WITH BIDIRECTIONAL POWER FLOW CAPABILITY

View U.S. Patent No. 12,255,550 in PDF format.

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The Invention

UW Madison researchers have developed a current-source inverter topology (H7-CSI-BD) combined with two new modulation schemes that have four-quadrant power flow, high power density, high efficiency, high fault tolerance, extended lifetime, and motor-friendly waveforms. The new H7-CSI-BD topology has one additional active switch (and one passive diode). The additional switch transiently shorts the dc-link's positive terminal directly to its negative terminal. In addition, this design uses bidirectional (BD) switches that have much lower conduction loss. The combination of zero-current switching and lower conduction loss make it possible for the H7-CSI-BD topology to achieve very high efficiency. There are new modulation schemes tailored for the H7-CSI-BD topology. A PWM scheme operates during its motoring operation with power flowing from the dc link to the machine. The other modulation scheme enables the H7-CSI-BD topology to achieve regenerative operation so that it can deliver power in the reverse direction from the machine back to the dc link. This modulation scheme not only enables the H7-CSI-BD topology to operate in its regenerative mode, but also enables the H7-CSI-BD topology to achieve significantly improved efficiency. These features would be ideal for electric vehicle applications.

Additional Information

For More Information About the Inventors

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Tech Fields

- Engineering : Electric machines
- Engineering : Power electronics & control systems

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