ESTD Engineering Science & Technology Division

Compact Diode-Clamped Multilevel Converter

Description

Diode-clamped multilevel inverters can synthesize a desired waveform from several levels of dc voltages. Their unique structure allows them to span high voltages without the use of transformers and with no voltage sharing problems. All three phases share a common dc bus, which can minimize system capacitance requirements.

Leon Tolbert (front) and Fang Peng apply power to a multilevel-converter-based bidirectional adjustable speed drive for a 50-kW axial gap permanent magnet motor.

Technology Importance

- The diode-clamped multilevel converter provides a high-efficiency (99%) because a fundamental frequency switching frequency can be used for individual devices.
- Suitable for large VA-rated motor drives.
- The large reduction in dV/dt significantly lessens EMI and hardens motors against bearing failures and insulation breakdown.

Technology Applications

- Medium-voltage, high-power motor drives
- Static var compensation
- Back-to-back intertie of asynchronous AC electrical systems
- Interface between high voltage DC (HVDC) and AC electrical systems
- Medium-voltage active filter to improve power quality
- Interface between DC distributed generation sources and AC utility

Points of Contact:

Power Electronics and Electric Machinery Research Center
Oak Ridge National Laboratory
2360 Cherahala Boulevard
Knoxville, TN 37932

Don Adams
Director
Phone: 865-946-1321
FAX: 865-946-1262
E-mail: adamsdj@ornl.gov

Laura Marlino
Technical Project Manager
Phone: 865-946-1245
FAX: 865-946-1262
E-mail: marlinold@ornl.gov

Website: peemrc.ornl.gov