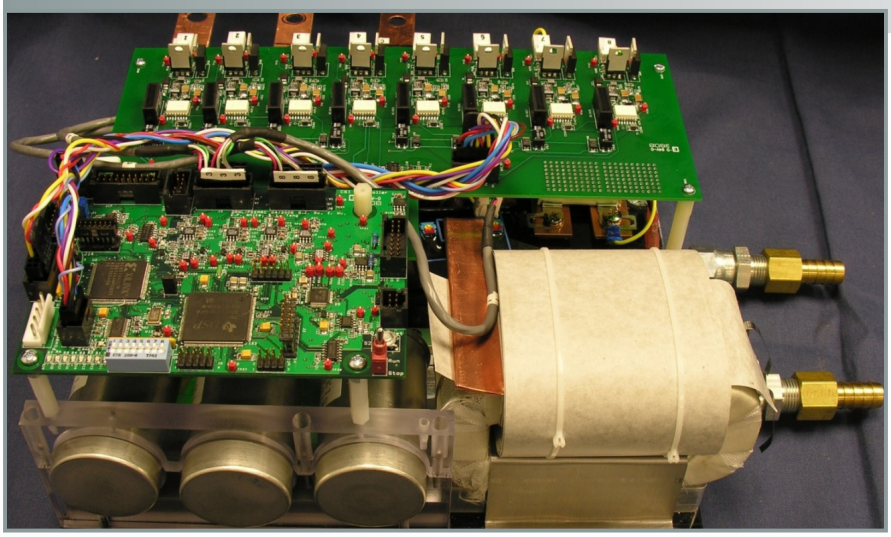
Combined Electric Machine and Current Source Inverter Drive System

UT-B ID 201002505



Technology Summary

This technology is a drive system that includes a permanent magnet-less (PM-L) electric motor combined with a current source inverter (CSI). This integration of these two ORNL technologies opens a new chapter for component function integration, instead of traditional integration by simply placing separate motor and inverter components in the same housing.

A permanent magnet (PM) is a major cost item in an interior PM machine. The cost of other PM machines such as PM wind power generators and megawatt PM motors depend on the supply of rare earth elements for production of PMs. Voltage source inverters need bulky, expensive, and temperature-limited DC bus capacitors. As operational temperatures increase, the ability of film capacitors to handle ripple currents decreases, necessitating the addition of even more capacitance. The current source inverter by itself can eliminate a large portion of the capacitors, but it requires additional inductors. This technology's integration reduces the dependency on rare earth elements and the need for additional inductors. In addition, elimination of several components reduces drive system cost, weight, and volume.

Advantages

- Reduced system cost, weight, and volume
- Reduces use of rare earth elements
- Component function integration

Potential Applications

- Electric motors, including electric and hybrid vehicles
- Wind power generators
- Industrial power generators

Patent

John S. Hsu. *Combined Electric Machine and Current Source Invertor Drive System*, U.S. Provisional Patent Application 61/417,906, filed November 30, 2010.

Inventor Point of Contact

John Hsu
Energy and Transportation Science Division
Oak Ridge National Laboratory

Licensing Contact

David L. Sims
Technology Commercialization Manager, Building, Computational, and Transportation Sciences
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.241.3808
E-mail: simsdl@ornl.gov

PARTNERSHIPS

09.2011
ORNL 2011-G00249/jcn