

Axial Gap, Permanent Magnet Motor Technology

Collaborating Institution: Visual Computing Systems, Inc. (VCS)

Objective

To refine the design of axial gap, permanent magnet motors employing segmented electromagnetic array technology and to demonstrate system capabilities for use as flywheel energy storage drives.

Technology Importance

Provides a low-cost, high-speed, efficient, high-power-density motor/alternator that substantially advances the development of commercially competitive flywheel energy storage systems.

Results

- B-3 motor was driven to 6000 rpm with a line-to-line voltage constant of .0258 V/rpm.
- B-3 was operated as an unloaded generator.
- A load was then switched on, and B-3 was operated in regenerative mode generating 14.3-kW peak output power at 3860 rpm.

Technology Uses

- Utilities: high-power-density generators for large flywheel energy storage systems
- Aerospace companies: high-speed motors for advanced aircraft use as turbine starters and main generators.
- Navy: constant torque motors with high power density for shipboard use.

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Motor test train mounted on lid of spin test tank located in the Power Electronics Laboratory.



ORNL/VCS motor test team behind labview data acquisition system (left) and pseudo PWM inverter (right) used to drive the B-3 motor and the radial gap dynamometer motor.