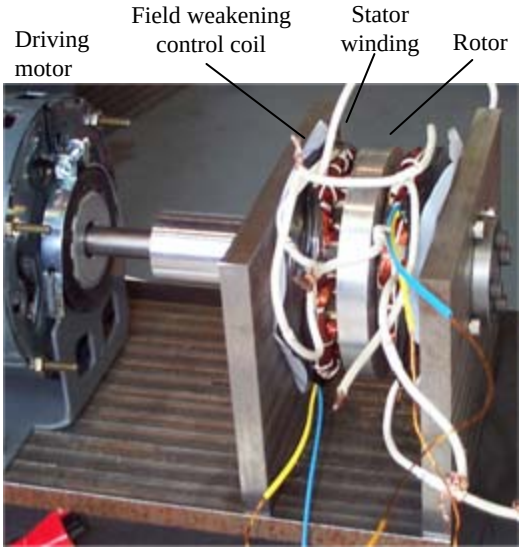
ESTD
Engineering Science & Technology Division

Direct Control of Air-Gap Flux of Permanent Magnet Machines

Objective

To directly control the output voltage of a permanent magnet (PM) generator to provide a wide speed-variation ratio for electric vehicle drives without demagnetizing the PMs.



ORNL researchers have developed a new permanent magnet generator with auxiliary field control for voltage regulation.

Goals

Design and build a prototype PM generator that has wide output voltage variability at a constant speed.

Other Application

Field weakening of PM motors.

Technology Description

A direct brushless field winding and novel rotor design allow for the regulation of the air-gap flux, and subsequently output voltage, of a PM generator. Higher than a 10:1 field weakening ratio has been obtained. No position sensor is necessary for inverter control.

Technology Importance

This PM motor/generator field-weakening method improves reliability and reduces cost, weight, and volume for the motor and associated controls in a hybrid-electric vehicle.

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