ICEMS 2004

International Conference on Electrical Machines and Systems Oct. 31 ~ Nov. 3, 2004 Jeju Island, Korea

Topic Area: Permanent Magnet Machines

Paper No. : OF-2 (503-M06-056)

Title: 3D Core Loss Calculation in BLDC Motor made of SMC Material

Author: Sang-Ho Lee, Ji-Young Lee, Jung-Pyo Hong (Chang-Won Univ., Korea), Jin-Hur, Ha-Gyeong Sung (Korea Electronics Technology Inst., Korea)

Date and Time: November 2, 2004 Tuesday 09:10 - 09:30

Venue: Chuja Hall

- Abstract -

In recent years there have been significant developments in soft magnetic composite (SMC) core materials. Powder metallurgy offers advantages including high material utilization, precise material control, and the ability to produce relatively complex shapes to excellent accuracy. However, the use of these materials in the construction of magnetic circuits in alternating current applications is limited by the relatively high eddy current losses occurring in the solid material. The core loss estimation can be the most important in designing electrical motors made of SMC material.

This paper deals with the core loss calculation of a BLDC motor made of SMC material. Since the teeth of motor partially have overhang in axial direction, 3-dimensional equivalent magnetic circuit network (3D EMCN) is used as an analytical method to get flux density of each element. The total core loss is calculated with the magnetic flux density and core loss curves of the SMC material. The calculated result is compared with core loss of the motor without overhang in stator teeth.

This study can be useful to effectively estimate iron loss including both hysteresis and eddy current losses in electrical machines made of SMC materials at steady state..

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November 2, 2004 (A.M)

Oral Session OE : DC-DC Converters and Applications 1

Date & Time : November 2, 2004 Tuesday
8:30 - 10:30

Venue : Udo Hall

Session Chairs : Mutsuo Nakaoka (Yamaguchi Univ., Japan), Sewan Choi (Seoul National Univ. of Tech., Korea)

08:30 - 09:00 OE-1 (501-M08-033) [Invited Paper]

PWM-PDM Dual Control ZCS DC-DC Forward Converter with Active Clamped Capacitor Specified for Battery Operation

Hidekazu Muraoka, Mutsuo Nakaoka (Yamaguchi Univ., Japan), Kenya Sakamoto (Kobe Univ., Japan)

09:00 - 09:10 Break

09:10 - 09:30 OE-2 (630-M09-079)

Modeling and Simulation of ac-dc Buck-Boost Converter Fed DC Motor with Uniform PWM Technique

Nabil A. Ahmed, Mutsuo Nakaoka, Hyun-Woo Lee (Kyung Nam Univ., Korea)

09:30 - 09:50 OE-3 (430-M08-019)

Analysis and Design of New Active Clamp Forward Converter with Improved Zero Voltage Switching (ZVS) Performance

Sung-Sae Lee, Sang-Kyoo Han, Gun-Woo Moon (KAIST, Korea)

09:50 - 10:10 OE-4 (428-M09-017)

Adaptive Control of Transverse Flux Machines Using Artificial Neural Networks

Amir Babazadeh, Arezoo Hanifi, Nejila Parspour (Bremen Univ. Germany)

10:10 - 10:30 OE-5 (426-M09-014)

Control of an Integrated Starter/Alternator for Automotive Applications

Yu-seok Jeong, Seung-Ki Sul (Seoul National Univ., Korea)

Oral Session OF : Permanent Magnet Machines

Date & Time : November 2, 2004 Tuesday
8:30 - 10:30

Venue : Chuja Hall

Session Chairs : Tomy Sebastian (Delphi Corp., USA) Jung-Pyo Hong (Changwon National Univ., Korea)

08:30 - 09:00 OF-1 (501-M06-049) [Invited Paper]

The Influence of Electromagnetic and Mechanical Forces in Permanent Magnet Synchronous Machine on Noise and Vibration

Shenbo Yu, Renyuan Tang (Shenyang Univ. of Tech., China)

09:00 - 09:10 Break

09:10 - 09:30 OF-2 (503-M06-056)

3D Core Loss Calculation in BLDC Motor made of SMC Material

Sang-Ho Lee, Ji-Young Lee, Jung-Pyo Hong (Chang-Won Univ., Korea), Jin-Hur, Ha-Gyeong Sung (Korea Electronics Technology Inst., Korea)

09:30 - 09:50 OF-3 (430-M06-023)

Improved Design and Performance Analysis of Permanent Magnet Transverse Flux Motors with Soft Magnet Composite Core

YouGuang Guo, Jian Guo Zhu (Sydney Univ. of Tech, Austrailia)