DQ17

A Study on Design Parameters of a Synchronous Reluctance Motor Considering Magnetic Saturation Effect

Ki-Chan Kim* and Ju Lee

Dept. of Electrical Engineering, Hanyang University, Seoul 133-791, South Korea

*Corresponding author: Ki-Chan Kim, e-mail: channykim@hanyang.ac.kr

When designing a synchronous reluctance motor (SynRM), it is very important to design arrangement and shape of barriers in its rotor to satisfy a design specification [1]. In order to maximize power density of a SynRM, it is necessary to design these parameters which characteristic can be easily explained by using d-axis and q-axis inductances [2]. However, a SynRM designing with complex barriers is apt to have nonlinear inductances because of magnetic saturation of its magnetic flux path [3]. Therefore it is difficult to perform an optimal design to have a maximum reluctance torque. There are two main design parameters to affect a characteristic of SynRM in connection with magnetic saturation. Fig. 1 shows the two design parameters (thickness of main segment for d-axis flux path and end rip for q-axis parameter). In the paper, the saturation effects according to these two design parameters are studied by analyzing d-axis and q-axis inductances by finite element method (FEM) and by experimenting with appropriate proto types. Finally we can perform an optimal design of a SynRM with less design parameters except these two important parameters.

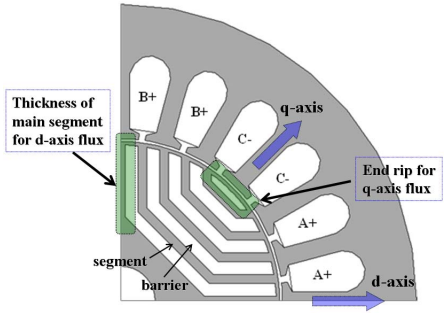

Fig. 1. Design parameters of SynRM.

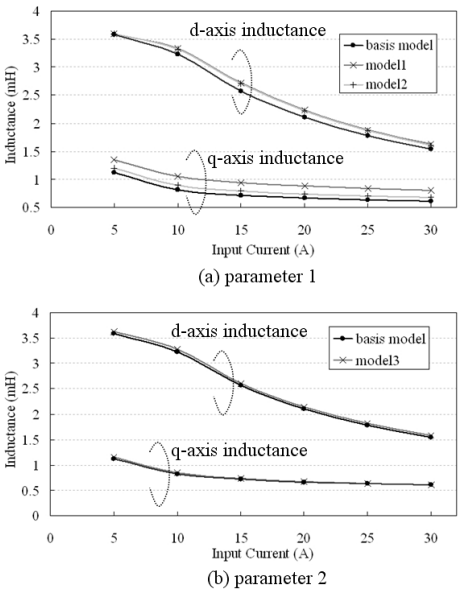

Fig. 2. Magnetic saturation effect according to parameters.

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DR01

Study on the Reaction Mechanism and Magnetic Properties of Metal/Ferrites Nanocomposite

Lei Wang[1], Qin Wang[1], Yan Chen[2], and Hua Yang[1]*

[1]College of Chemistry, Jilin University, Changchun, 130012, China

[2]State Key Laboratory of Inorganic Synthesis and Prepartive Chemistry, Jilin University, Changchun, 130012, P. R. China

*Correponding author: E-mail address: huayang86@sina.com

Metal/ferrites nanocomposite $Fe_xM_{1-x}/M_yFe_{3-y}O_4$ (M=Ni) (0<x, y<1) were synthesized by the hydrothermal synthesis route in a rotating autoclave. The growth of particles, the structure and the magnetic properties were investigated by Scanning electron microscopy (SEM), X-ray diffraction (XRD), and vibrating sample magnetometer (VSM). The reaction mechanism and the magnetic properties have been investigated in detail. Magnetization curve shows a round shape with a high saturation magnetization and low coercive force. The saturation magnetization value of composite powders is about 78.2 emu/g. The composite powder had a low coercivity value of 78.3Oe.