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

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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.

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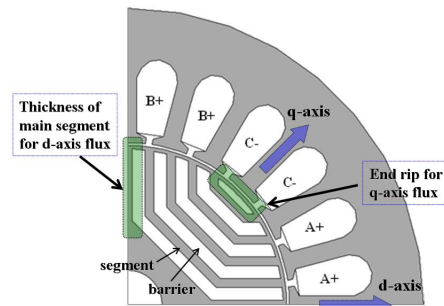
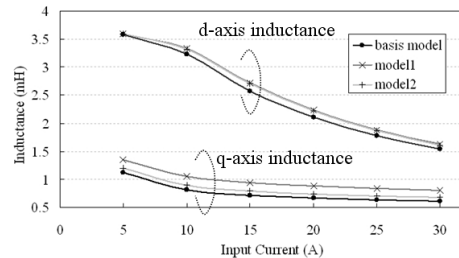
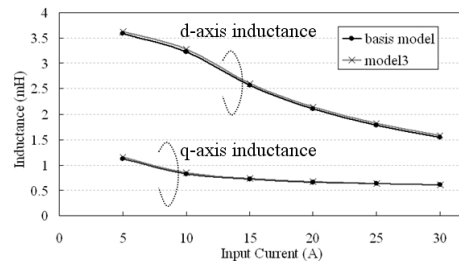


Fig. 1. Design parameters of SynRM.



(a) parameter 1



(b) parameter 2

Fig. 2. Magnetic saturation effect according to parameters.

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

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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.