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ANALYSIS OF DEMAGNETIZATION FAULT BACK-EMF OF PERMANENT MAGNET SYNCHRONOUS MOTOR USING MATHEMATICAL MODEL BASED ON MAGNETIC FIELD SUPERPOSITION PRINCIPLE

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Abstract

According to magnetic field superposition principle and characteristic of square wave series, back-EMF of permanent magnet synchronous motor (PMSM) under demagnetization fault

condition is decomposed into health component and demagnetization fault component. A operation of mathematical model of single slot and single phase no-load back-EMF, when demagnetization fault of different degree occurred in any magnetic body, any single pole and any multiple pole, is presented. The back-EMF mathematical model and the finite element simulation model results for 42 kW - PMSM, which has 8 poles and V-shaped permanent magnet rotor structure are compared, that allowed to verify the mathematical model. The results show that the back-EMF waveform of the slot winding can reflect the specific position and the severity of the demagnetization poles. The single phase back-EMF waveform can reflect only demagnetization conditions of all poles, but can not identify the specific position of the demagnetization poles. References 9, figures 5.

Key words: PMSM; demagnetization fault; back-EMF; mathematical model; simulation model.

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