

Determination of exploitation parameters of permanent magnet synchronous machine following the finite element solutions.

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Abstract

The paper presents the algorithm of conversion of the finite element computations using the 2D model of permanent magnet machine into the set of its main exploitation parameters. The novelty of proposed method is founded on representation of the air-gap field at any load conditions by means of linear combination of few basis functions. These functions are extracted from magnetostatic solutions of FE model at chosen loads. The key change against dq representation it is the replacement of magnetic fluxes linked with phase windings by means of flux densities functions equivalent to these fluxes. In result, it is possible to investigate non-sinusoidal shape of voltages or currents apart from limitations given by classic dq approach. The effect in third dimension of the slot skew is incorporated through low-pass filtering in spectral domain. The theoretical considerations are confirmed by measurements on industrial machine. All results in the paper are given for generator duty, however the method is general one and it may be applied for the motor analysis as well.

The paper falls into area **C3** Machine Design (preferred) or **B7** Hybrid Methods