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COMPUTATION OF PERIODIC MAGNETIC FIELD IN FERROMAGNETIC CONDUCTIVE MEDIUM AND SUPPLY CURRENT HARMONICS BY USING HARMONIC BALANCE FINITE ELEMENT METHOD

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Abstract

The harmonic balance finite element method for two dimensional periodic magnetic field in a conductive ferromagnetic medium is formulated. To convert of partial differential equation system into the system of nonlinear algebraic equations the weak formulation of Galerkin method is used. Structural steel and silicon steel with different magnetic properties and various electrical conductivity are studied. It is described how to take into account the nonlinear properties of medium in mathematical model. The spectrum of supply current and flux density on the surface and inside the medium were computed provided the sinusoidal voltage fed. The dependencies of the amplitudes of high harmonics versus the steel properties and amplitude of

the first harmonic of magnetic flux density at the surface of medium are presented. References 14, figures 5.

Key words: harmonic balance method, finite element method, ferromagnetic medium, magnetic field spectrum, current spectrum.

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