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SIMULATION OF NONLINEAR SKIN EFFECT UNDER SINUSOIDAL VOLTAGE SUPPLY BY USING HARMONIC BALANCE FINITE ELEMENT METHOD AND EFFECTIVE MAGNETIC CURVES

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Abstract

The nonlinear model of the time-periodic magnetic field in a conducting ferromagnetic medium is presented. The model is based on the combined use of the harmonic balance method and the finite element method. The case of magnetic field excitation by alternating sinusoidal voltage is considered. The values of eddy current losses are compared. They are determined using the method as well as monoharmonic approach with normal magnetization curve and the effective magnetic curves. It is determined that monoharmonic approach with normal magnetization curve gives the eddy current losses greater by about 9% than the losses obtained by harmonic

balance method. The monoharmonic approach using effective magnetization curves gives much smaller specific eddy current losses. References 6, figures 3.

Key words: harmonic balance method, finite element method, ferromagnetic conducting medium, eddy current losses.

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