

DOI: <https://doi.org/10.15407/techned2016.04.026>

OPTIMIZATION OF CONVERGENCE OF PERIODIC SOLUTION WHEN MODELING OF NONLINEAR SKIN-EFFECT BY FINITE ELEMENT METHOD

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	№ 4, 2016 (July/August)
Pages	26 – 28

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Abstract

The problem of accuracy modeling of the alternating magnetic field in the ferromagnetic medium by the finite element method by considering higher time harmonics of the field and the associated problem of ensuring the convergence of iterative process were considered. The numerically-harmonic model and the proposed solution algorithm based on the modified Newton's method were described. To accelerate the convergence the proposed algorithm includes the optimization procedure of damping coefficient by using Golden section method, as well as a set of heuristic rules that ensure reliability and speed of convergence. When solving the problem on excitation of magnetic field in rectangular domain with sinusoidal current waveform excitation the proposed algorithm showed convergence in several times better than

the package COMSOL versions 3.1 and 3.5. References 4, figures 3.

Key words: ferromagnetic medium, periodic process, time harmonics, skin-effect, finite element method, Newton's method, optimization of convergence.

Received: 19.02.2016

Accepted: 07.04.2016

Published: 21.06.2016

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