

DOI: <https://doi.org/10.15407/techned2020.06.069>**INFLUENCE OF WINDING ENDS ON THE PARAMETERS OF PULSE INDUCTOR WITH U-SHAPED CORE**

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 6, 2020 (November/December)
Pages	69 - 76

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Abstract

It is known from the scientific literature that magnetic pulse processing of electrically conductive non-magnetic sheet materials helps to reduce residual stresses, especially in welded joints. This is due to magnetoplastic and electroplastic effects. To create such effects in non-magnetic electrically conductive materials with welded joints, an inductor with pulsed magnetic field, U-shaped magnetic circuit and hollow conductor for possibility of active cooling of the winding is proposed. Such inductor allows inducing high-density pulsed currents in electrically conductive non-magnetic sheet materials with welded joints. It studies the parameters of the inductor - active resistance and inductance in the frequency-domain mode. The parameters calculated in two-dimensional and three-dimensional models are compared. The electromagnetic field is calculated using Maxwell equations and finite element method. Parameters of an ends of winding are determined by the difference in the parameters of the three-dimensional and two-dimensional models of the induction system. Resistance is calculated separately in the groove`s part of the winding, the outer part and on the frontal parts. The parameters of the induction system with a ferromagnetic core and non-magnetic thin-sheet alloy AMg6 are calculated for various values of complex amplitude of current in winding. Additionally, the parameters are calculated both without the magnetic core and without the non-magnetic metal. The quantitative comparison of the parameters of the three-dimensional model with the

two-dimensional one is performed. The active resistance and inductance of end parts of the inductor are investigated by well-known analytical expressions from handbooks of electric machines. References 11, figures 3, tables 6.

Key words: magnetic-pulse processing, U-shaped core, electromagnetic parameters, winding's ends.

Received: 08.01.2020

Accepted: 27.07.2020

Published: 21.10.2020

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<https://doi.org/10.15407/techned2019.06.005>

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