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Possibilities of Increase in Energy Efficiency and Unification of Transformer-Rectifier Equipment with Twisted Elements of Magnetic Circuit

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Abstract

Increasing energy costs and the need for further energy conservation lead to an increase in the requirements for reducing losses in transformer and reactor magnetic circuits. Traditionally, transformer and reactor equipment is improved by applying the achievements of electromaterials science and new technologies to traditional structures and structures of electromagnetic systems. Recently, the use of amorphous steel strip with coiling technology has been expanding in the production of magnetic cores, which in three-phase versions are made three-circuit combined of elements and are characterized by 33% of additional losses. The improvement of three-phase transformers and reactors with twisted magnetic cores is possible by the method of structural transformations of active parts with magnetic coupling of phase twisted circuit elements. The options, advantages and disadvantages of these transformations are considered. On the basis of the identity of mathematical models and dimensionless indicators of the objective functions of structural and parametric optimisation of identical transformer and reactor designs, it is expedient to unify their electromagnetic systems with magnetic coupling of the twisted elements of jointed magnetic cores. © 2023 IEEE.

Author keywords

additional losses; reactor; structural transformations; three-phase twisted magnetic circuit; transformer; unification

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Engineering controlled terms Energy efficiency; Magnetic cores; Structural optimization; Timing circuits

Engineering uncontrolled terms

Additional loss; Electromagnetic systems; Increasing energy costs; Reactor; Structural transformation; Three phase; Three phasis; Three-phase twisted magnetic circuit; Transformer; Unification

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- 1 Targosz, R., Topalis, F.V. Energy efficiency of distribution transformers in Europe (2007) 2007 9th International Conference on Electrical Power Quality and Utilisation, EPQU, art. no. 4424121. Cited 16 times. ISBN: 8469100572; 978-846910057-8 doi: 10.1109/EPQU.2007.4424121 View at Publisher
2 De Almeida, A., Santos, B., Martins, F. Energy-efficient distribution transformers in Europe: impact of Ecodesign regulation (2016) Energy Efficiency, 9 (2), pp. 401-424. Cited 22 times. http://www.springer.com/environment/journal/12053 doi: 10.1007/s12053-015-9365-z View at Publisher
3 Blume, S., Blela, J. Optimal transformer design for ultraprecise solid state modulators IEEE Transactions on Plasma Science -, 41 (10), pp. 2691-9700. art.
4 Chen, B., Liang, X., Wan, N. Design Methodology for Inductor-Integrated Litz-Wired High-Power Medium-Frequency Transformer with the Nanocrystalline Core Material for Isolated DC-Link Stage of Solid-State Transformer (2020) IEEE Transactions on Power Electronics, 35 (11), art. no. 9069466, pp. 11557-11573. Cited 52 times. https://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=63 doi: 10.1109/TPEL.2020.2987944 View at Publisher
5 Zagirnyak, M., Prus, V., Miljavec, D. Improved method for calculation of parameters of electromagnetic and power processes in electric circuits with steel in saturation of mode (2015) Technical Electrodynamics, 2015 (4), pp. 12-18. Cited 15 times. http://techned.org.ua/en/index.php?view=article&id=812963&2015-n4-s28&format=pdf&option=com_content&Itemid=77
6 Sadovoy, O., Avdieieva, E., Vakhonina, L., Shebanin, V. Comparison of the Active Parts of Single-Phase Transformers with Twisted and Laminated Magnetic Circuits (2021) Proceedings of the 20th IEEE International Conference on Modern Electrical and Energy Systems, MEES 2021. Cited 7 times. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=9598465 ISBN: 978-166542366-3 doi: 10.1109/MEES52427.2021.9598597 View at Publisher
7 Zagirnyak, M.V., Prus, V.V., Lyashenko, V.P., Miljavec, D. Structuring soft-magnetic composite materials (2011) Informacije MIDE M, 41 (2), pp. 86-91. Cited 15 times.
8 Zagirnyak, M., Serhienko, S., Serhienko, I. Improvement of the qualitative characteristics of an automatic control system with a fractional-order PID-controller (2017) Proceedings of 2017 18th International Conference on Computational Problems of Electrical Engineering, CPEE 2017, art. no. 8093062. Cited 9 times. ISBN: 978-153861040-4 doi: 10.1109/CPEE.2017.8093062 View at Publisher
9 Serhienko, S., Serhienko, I. Performance enhancement of the relay automatic control system with a fractional-order controller (2017) Proceedings of the International Conference on Modern Electrical and Energy Systems, MEES 2017, 2018-January, pp. 76-79. Cited 9 times. ISBN: 978-153861750-2 doi: 10.1109/MEES.2017.8248956 View at Publisher
10 Zagirnyak, M., Prus, V. The special features of the change of electromagnetic parameters of electric machines with long mean-time between failures (2018) Przegląd Elektrotechniczny, 94 (1), pp. 117-120. Cited 3 times. http://sjigma-not.pl/czasopisma-48-elektronika-energetyka-elektrotechnika-przeglad-elektrotechniczny.html doi: 10.15199/48.2018.01.30 View at Publisher
11 Zagirnyak, M., Prus, V., Somka, O. The Methods for Accounting the Degree of Electric Machines Aging in the Assessment of their Reliability (2019) Proceedings of the International Conference on Modern Electrical and Energy Systems, MEES 2019, art. no. 8896468, pp. 194-197. Cited 2 times. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=8891873 ISBN: 978-172812569-5 doi: 10.1109/MEES.2019.8896468 View at Publisher
12 Kravchenko, A., Metelsky, V. Dry energy saving transformers (2013) Elektrik. International electrotechnical journal. - Kiev: Radioamator, (4), pp. 12-15. Cited 2 times.
13 Kravchenko, A., Metelsky, V. Oil energy saving transformers Elektrik International Electrotechnical Journal. - Kiev; (5), pp. 14-17. Cited 2 times. Radioamator, -- № -- c
14 Najafi, A., Iskender, I. Comparison of core loss and magnetic flux distribution in amorphous and silicon steel core transformers (2017) Electrical Engineering, pp. 1-7. Cited 4 times.
15 Hernández, I., Olivares-Galván, J.C., Georgilakis, P.S., Cañedo, J.M. A novel octagonal wound core for distribution transformers validated by electromagnetic field analysis and comparison with conventional wound core (2010) IEEE Transactions on Magnetics, 46 (5), art. no. 5427073, pp. 1251-1258. Cited 30 times. doi: 10.1109/TMAG.2010.2040623 View at Publisher
16 Sengul, M., Alboyci, B., Cinar, M.A., Tekdemir, I.G. The Effects of Design Parameters on The UNICORE Type Transformer Inrush Current (2022) Kocaeli Journal of Science and Engineering, 5 (1), pp. 31-41. № -- P. org
17 Stavinskii, A., Shebanin, V., Avdieieva, E., Tsyganov, A., Stavinskiy, R., Sadovoy, O. Dependence of the Indicators of Three-phase Transformers with Planar Plate Magnetic Wires from Variants of Rod Configuration (2019) Proceedings of the International Conference on Modern Electrical and Energy Systems, MEES 2019, art. no. 8896451, pp. 102-105. Cited 9 times. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=8891873 ISBN: 978-172812569-5 doi: 10.1109/MEES.2019.8896451 View at Publisher
18 Stavinskii, A., Vakhonina, L., Sadovoy, O., Saravas, V. Weight-to-price indicators of electromagnetics circuits single-phase transformers and reactors with twisted magnetic systems (2017) Proceedings of the International Conference on Modern Electrical and Energy Systems, MEES 2017, 2018-January, pp. 172-175. Cited 8 times. ISBN: 978-153861750-2 doi: 10.1109/MEES.2017.8248881 View at Publisher
19 Avdieieva, E., Stavinskiy, R., Sadovoy, O., Shebanin, V., Vakhonina, L., Andrii, R. Technological Parameters of the Magnetic Circuit of the Compact Transformer for Aggregate Electric Drive (2020) Proceedings of the 25th IEEE International Conference on Problems of Automated Electric Drive. Theory and Practice, PAEP 2020, art. no. 9240779. Cited 8 times. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=9240771 ISBN: 978-172819935-1 doi: 10.1109/PAEP49887.2020.9240779 View at Publisher
20 Tikhomirov, P.M. (2013) Calculation of transformers: textbook for universities - M: Alliance, p. 528. Cited 30 times.
21 Stavinsky, A.A., Stavinsky, R.A., Avdeeva, E.A. Method of comparative analysis of static electromagnetic systems differing in structure and configuration of elements (2014) Machinery, 14 (90), pp. 53-60.
22 Spatial joint magnetoconductor A.c. 1390648USSR. A. Gladkii, I. Zagryadtskii. №4143054/24-07; Statement 03.11.89; Published 23.04.88, Bulletin №15 - 2 c
23 Gladkii, A.P., Emelyanov, L.I., Yerin, V.A., Gladkii, A.P., Emelyanov, L.I., Yerin, V.A. Statement A.c. 1422250 USSR. -- №4218344/24-07; 03.87; Published 01.09.88; Bulletin №33 - 2c
24 (2014) The method of manufacturing a magnetic circuit of a three-phase induction device Patent №99329 Ukraine. A.A. Stavinsky, R.A. Stavinsky, E.A. Avdeeva. -- №U201414186; Statement 30.12. Published 25.05.2015, Bulletin №10. -- 5c

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