

Universal theory of autotransformer. Part 2

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The dominant role of the vector magnetic potential in the disclosure of behavior features of autotransformers is shown. The existence of characteristic or a-invariant surfaces in the window of an idealized autotransformer on which the vector potential does not depend on the load is proved. It turned out that, unlike transformers, in the autotransformer all characteristic surfaces can be inside its General winding. Contrary to the provisions of the traditional theory, it also contains the partition surface of flows at short-circuit. The distribution of the vector potential is characterized by stronger differences in comparison with transformers, which is the reason for its lower electrodynamic resistance to short-circuit. The reliability of the presented results is confirmed by the correctness of the two-transformer 4T-shaped replacement circuit used for the proof of the autotransformer, which allows taking into account the feature of the distribution of magnetic fluxes in it in all operating conditions.

The physical meaning and the influence of these features on the electrodynamic forces arising in case of emergencies in autotransformers are waiting for the explanation. The distribution of the vector potential has a more powerful variation, which explains the increased excitement of the magnetic system of the autotransformer in case of short circuit and its low electrodynamic resistance compared to the resistance of the transformers. The accuracy of the presented results confirmed the correctness of the evidence used for two-transformer 4T-shaped equivalent circuit of the autotransformer, which allows considering the peculiarity of the distribution of magnetic flux in it in all conditions.

Keywords: autotransformer, primary and secondary windings, magnetic flux, vector diagram, vector potential.