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Principle of the autotransformer theory.

It is confirmed that to understand the physical foundations of autotransformer principle and operation the theory is necessary, which is based on the model which clearly displays its distinctive properties – to transport energy along two parallel paths: electrical and electromagnetic. The idea is implemented as a generic two-transformer equivalent circuit. Universalism manifests itself in the diagram (simultaneously with the power fluxes) of all the magnetic fluxes in the sites window (i. e., in the thickness of the windings and in the gap between them) and in parts of the magnetic circuit and in fields between it and the tank in the event of saturation of the steel. Vector diagram of the operating mode of the autotransformer is characterized by the same completeness. Using this diagram it is easy to explain the overexcitation of individual parts of the magnetic circuit in a short-circuited autotransformer and derive formulas for determining super- and antisperations (in comparison with flows in no-load mode). Presented equivalent circuit is applicable both for step-up and step-down autotransformers and for the study both steady-state and transient processes.

Keywords: autotransformer, primary and secondary windings, magnetic flux, short circuited, equivalent circuit, idling.