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# TECHNICAL AND ECONOMIC PARAMETERS OPTIMIZATION OF THE ROTATING HALF TRANSFORMER FOR WIND TURBINES OF VARIOUS POWERS

Autonomous contra-rotating wind turbine with vertical axis of rotation (VAWT), in which there is the rotating half transformer (RHT) conducting noncontact transmission and regulation of generated electricity, is of non-traditional design. Therefore, to determine the value of its main components shares cost, the methodology of expert evaluation was used. After analyzing the market value of an autonomous VAWT of different manufacturers and the results of expert evaluation, we determine the estimated market value of the three-phase RHT. Having reviewed the methodology of the developed design calculations it has been analyzed that problem of determining the optimal technical and economic parameters variation implementation can be operated by two parameters: the inner diameter of the core and the induction in the core. The analysis shows that there is no direct relationship between the dimensions and the cost of RHT. The induction in the core also has nonlinear effect on these parameters. With two objective functions (cost and efficiency) and two arguments (the inside diameter of the core and induction in the core), the two-parameter problem of determining the optimal technically and economically reasonable design of RHT was obtained. According to the results of the study the best option of RHT design was obtained.

The procedure of determining the value and efficiency for a number of wind turbine capacities – 1 kW, 2 kW, 5 kW and 10 kW was carried out. Moreover, in this study the only one variable – the inside diameter of the core was remained, and the induction is fixed in it at 0.5 T, which is defined in the previous task as optimal. For the implementation of the technical and economic parameters of RHT optimization, the generalized geometric criterion that combines efficiency and cost of RHT is introduced. The optimum design options of RHT and their technical and economic performances are determined. Analysis of expert evaluation and the calculated value of RHT showed that the real value of RHT for all power autonomous contra-rotating VAWT is lower than predicted value. This confirms that RHT does not increase the total price of wind turbines, and the use of RHT for contactless transmission and regulation of generated electricity parameters is more effective in wind turbines with higher capacity.