In its widest sense the term gasification covers the conversion of any carbonaceous fuel to a gaseous product with a useable heating value.

The future of gasification is intimately intertwined with the future of energy and energy policy. It is generally recognized that human development cannot continue to base its economy on fossil fuels in the present manner forever. Gasification can play an important role in the transition between fossil fuels and a fully "renewable world". First, in the move toward a hydrogen economy, one can expect that the hydrogen will be produced directly from fossil fuels rather than by electrolysis. Second, gasification is a key technology for more efficient power generation from coal and heavy oils with the best environmental performance. And third, gasification provides the best option for producing concentrated carbon dioxide streams that may have to be sequestered during the transition in order to reduce the emission of greenhouse gases [3].

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DEVELOPMENT OF THE PROGRAM FOR RESEARCH OPERATING MODES OF THE POWER AUTOTRANSFORMER

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The power autotransformer has the following operating modes: the autotransformer, transformer and combined operating modes [1].

At department of electric power systems of Power engineering Institute of Tomsk polytechnic university the program for the analysis of operating modes of autotransformers was developed. This program doesn't meet requirements of the modern interface and has weak opportunities regarding verification of data.

The new program is presented in this report. Working windows of the new program are presented in figures 1-4: descriptions of the program, input of basic data, conclusion of results, checks.

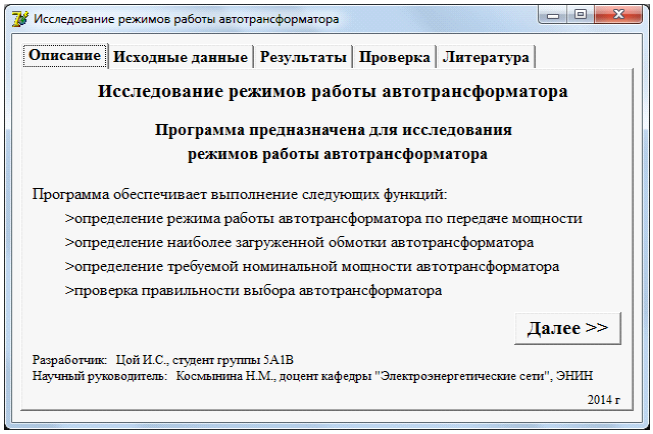

Fig. 1. Window of the description of the program

Fig. 2. Window of input of basic data

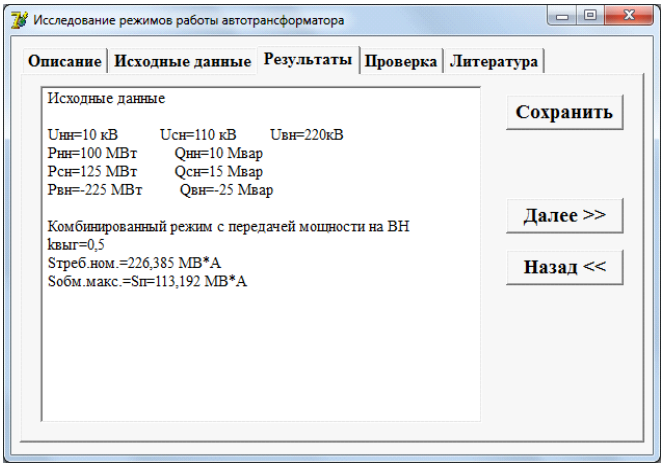

Fig. 3. Window of a conclusion of results

At the autotransformer modes the winding of the lowest tension (LT) is opened, there is a transfer from the highest tension (HT) on the party of the average tension (AT) or on the contrary.

The autotransformer can work in one of three transformer modes: transfer of power from LT on HT (or on the contrary) at the opened party of AT; from LT on AT (or on the contrary) at the opened party of HT; from LT on AT and HT (or on the contrary).

In the combined mode all three windings of an autotransformer participate in transfer of power, and there are overflows between AT and HT. Two combined modes are possible: with transfer of power on the party of AT (or from AT), with transfer of power on the party of HT (or from HT).

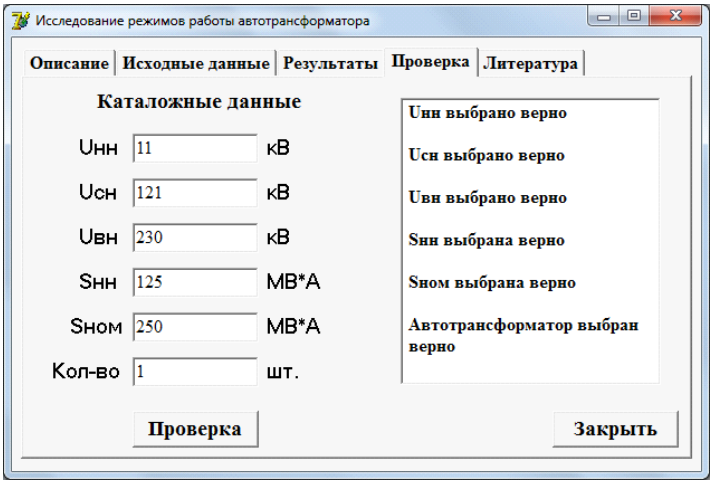

Fig. 4. Window of check of correctness of a choice autotransformer

As a programming language the Delphi language offering ample opportunities for creation of the convenient interface [2; 3] was chosen.

Conclusion: the developed program possesses the best mobility and simplicity in comparison with the previous version of the program.

The program allows

1) to define the most loaded winding;
2) to determine an operating mode by transfer of power;
3) to calculate the demanded rated power;
4) to keep settlement data in the form of the file;
5) to check correct selection of the autotransformer;
6) to study reference methodical material on this subject.

The developed program can be used in learning activity for students of Bachelor degree programs 13.03.02 Electric Power Engineering and Electrical Engineering.

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DEVELOPMENT OF SYNCHRONOUS GENERATOR PROTECTION METHOD AGAINST TURN-TO-TURN SHORT CIRCUIT ROTOR WINDING

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Introduction. A synchronous generator turn-to-turn short circuit rotor winding is common [1] and difficult to control [2]. Detection of turn-to-turn short circuit, using standard equipment, is a challenging task due to a number of reasons. Methods, based on turbine generator internal and applied magnetic field analysis, are considered promising, because there is a symmetric configuration of magnetic field in the air gap, iron and around the iron. This configuration is directly-proportional to turbine generator rotor winding technical state.

A magnetic field sensor setting is necessary to control turn-to-turn short circuit rotor winding based on magnetic field symmetry analysis. A rating of spatial pattern magnitude of disturbance is more important than magnetic field components magnitude for relay protection objects. It means that it is necessary to rate the current poles field changes relative to each other.

A new method for protection of a synchronous generator turn-to-turn short circuit rotor winding, based on the unipolar signal analysis, which is obtained from the magnetic stray field sensor output, is suggested. A device for this method implementation was developed and tested. In addition, protection values were set.

Problem statement: to receive the turn-to-turn short circuit rotor winding characteristic, to develop the method and protection device based on dispersion field magnetic sensor installed in the synchronous generator end zone.