

Methods of the electrical networks' modes optimization

Discipline belongs to the group of the professional preparation academical disciplines.

The subject of the discipline connected with the methods of single- and multicriterial optimization (improvement) of the technical and economical indexes of the electrical networks' long-last steady state modes. Questions of the forming of the criteria-oriented objective functions based on the different power systems' mathematical models is considered. The information about the modern means of the electrical networks' modes parameters optimization is provided, features of the means using and parameters calculation is described.

The goal of the discipline is to form the abilities:

- to form the subject function and limitations of the problem of the complex optimization electrical network modes' parameters;
- to provide the subject function optimization of the of the problem of the complex optimization electrical network modes' parameters with the gradient methods with limitations taking into account;
- to estimate of the inhomogeneity ratio of the electrical networks' contours;
- to identify the settings of the optimization means of the inhomogeneous electrical networks' contours;
- to provide economically grounded selection of the optimization means of the inhomogeneous electrical networks' contours;
- to provide optimal distribution of the reactive power in the electrical networks with the criterion of the minimum active power losses taking into account;
- to provide distribution of the reactive power in the electrical networks with the criterion of the desired voltage levels.

Mathematical models of the electrical networks

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The subject of the discipline connected with the forming and solving of the systems of the algebraic, differential and logical equations, which are describing physics phenomenon and processes, connected with generation, transmission and distribution of the electrical energy. Mathematical models of electric power system elements and theirs' using for the solution of the problem steady states and dynamical states parameter calculation is considered.

The goal of the discipline is to form the abilities:

- to use of the modern analysis and calculation methods for the estimation of the parameters of the power system's equipment modes;
- to select an effective method of the calculations of the electrical methods modes' parameters;
- to use modern computing technologies for the calculations of the electrical methods modes' parameters;
- to analyze possible negative consequences in the processes of the generation, transmission and distribution of the electrical energy and to use an effective methods for the elimination of such consequences.

Control of the power systems' modes parameters

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The subject of the discipline connected with the methods and means of the control of the power systems' parameters of the normal and post-accident modes. Modern means of the regulation of the supply voltage level variations, asymmetry and non-sinusoidality regulation, frequency variations in power systems is considered. Calculation of the optimal parameters of the regulation means is described.

The goal of the discipline is to form the abilities:

- to define the influence of the voltage and frequency variations from the nominal values to the electrical load levels;
- to estimate of the parameters of the series and parallel compensation means and to select theirs' allocation places in power systems;
- to select of the power transformers' and autotransformers' regulation taps to provide desired voltage levels;
- to provide feasibility study of the selection of the optimal regulation means in power systems;
- to select the optimal means of the voltage regulation in power systems.

Computer solution of the power engineering problems

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The subject of the discipline connected with the studying of the specialized software in the field of electric power systems and networks. The using of "Power Factory" and "Neplan" software complexes for the steady states and transient states parameters calculation and optimization is considered.