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APPLICATION OF GRAPH THEORY FOR THE CALCULATION OF POWER SUPPLY SYSTEMS. SHORTEST SKELETON GRAPH. NETWORK WITH THE LEAST AMOUNT OF POWER LINES

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A rationale for the application of graph theory to rationalize the structure of the system power supply voltage of the middle class. Carried out theoretical and practical search for shortest cores graph. Set targets for further research.

Graph theory is an effective device formalization of modern engineering and scientific problems arising in the study of large and complex systems, and the language of graph theory developed enough and convenient. Currently, graph theory has received wide practical application. Graphs are used in the analysis and design of systems of electricity, water, gas, heat supply, transport networks and so on. In this case, are of particular interest for solving optimization problems on graphs.

The purpose of research ─ To analyze the feasibility of using graph theory to minimize the distance transmission of electrical energy in power systems and create problems for further research.

Materials and methods of research.

In solving practical problems edges of G are compared (attributed) number - edge is associated with a number called the weight or length or value (price) of the edge. Then the graph G is a graph with weighted edges. Sometimes weight (numbers) are assigned to the vertices of the graph, and then obtain a graph with weighted vertices. If the graph of weight and assigned to the edges and vertices, then it is simply called balanced.

We will consider weighted graphs, where each edge has a length and the vertices represent the electrical load. Shows a particular scheme mains, thus illustrating a weighted graph. Numbered vertices 1,2, ..., 10 symbolize the place of

consumption of electric energy (consumers), and the top 11 corresponds to the supply substation. Given the coordinates of the vertices and power consumption, which is a burden for the substations in Table. 2 lengths of the edges. Note that the total length of the network is 42.52 km.

The results of research. Prim's algorithm constructs a minimum spanning tree on one edge, is on the edge of each step, which is attached to a single tree growing. Kruskal's algorithm also constructs the shortest frame, adding to it one edge, but unlike the Prim's algorithm, it searches for an edge that connects two trees in the forest, growing subtrees formed by the shortest core. The construction begins with a degenerate forest trees from V (each consisting of a single vertex), and then performing a merging two trees (most short ribs), until there is only one tree - the shortest skeleton.

Lengths of the edges constructing the shortest network are shown in Table. The total length of transmission lines is 35.53 km.

Findings

As a result of the application of graph theory to rationalize the structure of the power supply system at constant composition, location and terms of installed capacity of consumers, based on the theoretical and practical search for shortest cores count was reduced length of transmission lines at 7 km (16.5%). Thus, using this method can optimize the structure as newly designed electrical networks and, if necessary, the existing structural reconstruction.