

MODEL OF DISTRIBUTED SPACE POWER SYSTEM MOTION CONTROL

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The goal of this article is to develop a generalized mathematical model for controlling the motion of the spacecraft of a space industrial platform's distributed power system. Space industrialization is one of the promising lines of industrial development in the world. The development of space industrial technologies will allow one to solve a number of problems in the production of unique products unavailable under terrestrial conditions. The main types of these products include semiconductor materials, materials made by 3D printing in microgravity, space modules of sunshade systems, space metallurgy products, space debris processing products, and high-purity space biology substances. Taking this into account, a certain amount of electricity is required for the manufacture of one or another product. Given that some space industrial processes can consume a significant amount of electricity, a space industrial platform's own power generation may not be sufficient. Because of this, it was proposed to use additional energy resources through the development of a distributed power supply system for a space industrial platform. A group of power spacecraft is envisaged to collect and accumulate electric energy and transmit it in a contactless way to the receivers of the space industrial platform.

The article presents mathematical models for the analysis of the orbital, angular, and relative motion of power spacecraft and receiver spacecraft. Algorithms are proposed for calculating the parameters of the power spacecraft orientation and stabilization system. A generalized model is constructed for determining the maximum distance and time interval of power spacecraft to platform electric power transmission using microwave radiation.

The model developed allows one to choose the power spacecraft design parameters at the stage of conceptual design of space industrial platform power systems.

Keywords: *space, conceptual design, industrial platform, functional model, distributed system, contactless energy transfer.*

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