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**THE ROLE OF THE MATLAB/SIMULINK PACKAGE IN DIPLOMA DESIGN**

*An overview of works devoted to the problems of design and numerical modeling of the power supply system of aircraft − aircraft PSS in the Matlab / Simulink package, carried out by Russian and foreign researchers, is given.*

*Key words: aircraft power supply systems, modeling the operation of aircraft power supply systems in the Matlab / Simulink package.*

The paper presents an overview of the works devoted to the numerical modeling of the aircraft PSS, which is of interest to specialists dealing with this topic. Monographs [1 − 3] will be used as starting guides for carrying out numerical calculations of power electronics systems, as well as the electric drive of electromechanical systems in the Matlab / Simulink package.

Currently, in aviation, a three-phase AC 115/200 V system with a constant frequency of 400 Hz with a semiconductor converter (PP or FC) is used. A promising high voltage constant current system is ± 270 V [4].

The authors of [4] consider a system for generating low voltage direct current as promising, where the functions of a PCB (semiconductor converter) are performed by a voltage rectifier made on a modular basis on MOSFET transistors (Fig. 1).

The authors of [4] adopted a system for generating a current of a stable frequency of 400 Hz and a voltage of 115 V as a promising alternating current system for PSS aircraft (Fig. 2).

An aircraft with enhanced equipment electrification (EEC) is an aircraft in which thrust is created by traditional engines, and a large mass of equipment receives energy from a centralized PSS of the aircraft. The scheme of the PSS of the aircraft, in which this concept is implemented, is presented by the authors of [5] in (Fig. 3). The aircraft, the thrust in which is created using an electric power plant, is called a fully electric aircraft (FEA) [6]. An aircraft with a mixed thrust is called a hybrid aircraft [7].

Let us turn to the work carried out by Russian and foreign researchers towards an aircraft with increased electrification, who used the Matlab simulation package in their work.

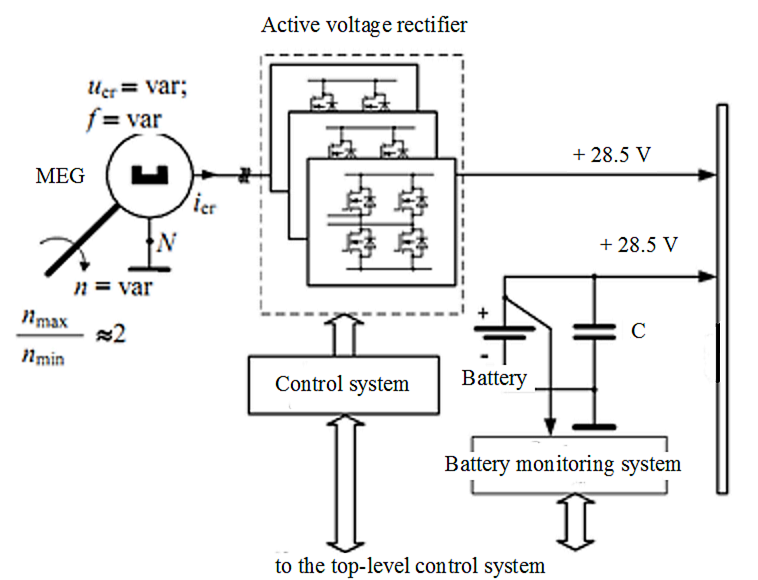


Fig. 1. DC generation system with AVR

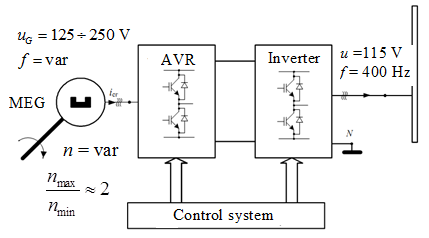


Fig. 2. The system for generating alternating current of a stable frequency of 400 Hz and a voltage of 115 V

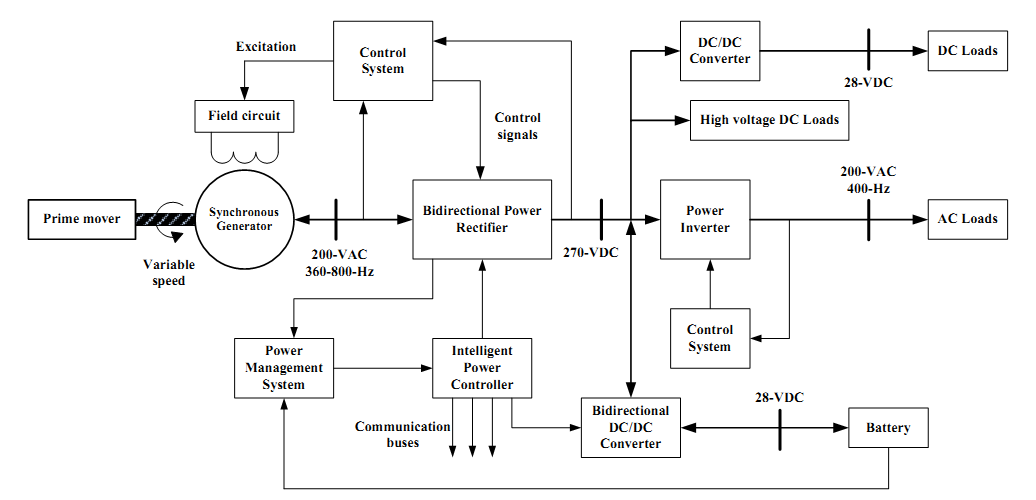


Fig. 3. Electricity distribution system of aircraft with increased electrification

In work [8], a regular replacement of an electric drive EPPZ−334 of a similar hydraulic drive of the wing mechanization movement system − SPMK−9 of an aircraft was carried out. The author of [9] has developed a magnetoelectric synchronous MEG generator with a capacity of at least 200 kV ∙ A and more alternating current, which serves as an SG starter-generator. In [10], a high-voltage direct current electric generator with a capacity of up to several hundred kilowatts was developed with a direct drive from an aircraft engine operating in a system with an electronic converter. The author [11] has developed and numerically modeled a backup system for generating electrical energy based on a magnetoelectric generator and a voltage inverter, built using a modular principle.

The basics of simulation modeling of PSS aircraft in the Matlab package are presented in the monograph [12]. The work [13] presents a model of a synchronous machine − SM with a damper winding, further calculated in the Matlab package. A model of synchronous connection of generators to a single network has been investigated. The authors of [14] developed a refined model of a synchronous generator − SG, presented in the form of three machines: the exciter, the exciter and the generator itself. The results of modeling in the Matlab package are presented. In [15], the SG model is presented by a system of matrix equations. The block diagrams of the voltage regulator and constant speed drive are given. The PSS aircraft model is implemented in the Matlab / Simulink package.

The authors of [16] presented the results of simulation modeling of the power unit of the PSS of fully electric aircraft in the Matlab / Simulink package. The authors of [17] simulated the PSS of the Il − 76 aircraft in the Simulink package. Models of PSS of alternating and direct currents, their elements, simulation results are presented. In [18], simulation modeling was carried out in the Matlab / Simulink package for DC PSS of the Su-30SM aircraft in normal and emergency operating modes. The authors of [19] developed a simulation model of the PSS of the Su-27 aircraft in the Matlab / Simulink package. It allows you to explore the PSS of the aircraft both in normal and emergency operating modes. The author of [20] carried out a simulation of the operation of AC and DC systems of the PSS of IL−76 aircraft in the Matlab / Simulink package. In [21], a model of a power supply system for a promising long-range aircraft in the SimInTech software package is considered. The results of modeling a four-channel system for generating and distributing AC power during normal operation are presented.

In the article [22], the simulation of the propulsion mode of a starter-generator set for an aircraft gas turbine engine in the Matlab / Simulink package was carried out. A permanent magnet synchronous motor is used as an electrical machine.

The author of [23] presents a system for regulating the frequency of the output voltage of a synchronous generator, developed on the basis of fuzzy logic using a genetic algorithm that allows optimizing the characteristics of the frequency regulator.

The work [24] presents a methodology for designing of an aircraft PSS. The tasks required for the implementation of automation of the design process of the aircraft PSS are listed. The authors of [25] presented the modeling of the PSS for aircraft of Bombardier Global Express aircraft in the Simulink package (an autonomous implementation model) and the OPAL−RT solver (for real-time modeling). The authors of [26] presented a cross-platform methodology for designing an aircraft solar power plant. The packages used to simulate the operating modes of the PSS aircraft − Matlab / Simulink and Modelica.

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