Materials of Conferences

NECESSITY OF DEVELOPMENT OF METHODS AND DEVICES OF INCREASE THE ACCURACY OF ANALOG-DIGITAL TRANSFORMATION PROCESS

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Today digital processing of signals is impossible without preliminary analog-digital transformation. Analog-digital converters (ADC) provide direct communication and transfer of the measuring analog information from object of measurements in the computing or managing digital device. Thus, reliability of the information about meanings measuring of sizes, and, therefore, productivity of the decisions, accepted on their basis, or quality of management of processes, are defined by accuracy used ADC. From here follows the importance of study of the reasons influencing accuracy of transformation, and also realization of researches directed on increase to accuracy of transformation.

In practice for the decision of a task of increase the accuracy of process of analog-digital transformation, use only precision ADC, in perfection and which creation the modern firms - developers of electronic components are engaged. However, it completely does not decide the put task for several reasons. First, high accuracy of the characteristic ADC yet are not a guarantee that in conditions of influence external damage of the factors, at which equipment given ADC all also usually works will be exact. Secondly, the process of analog-digital transformation is complex and provides besides the basic operation of analog-digital transformation which is carried out ADC, also performance of a number of necessary accompanying operations substantially determining accuracy of transformation in whole. It is operations previous to analog-digital transformation: samples and storages of entrance signals ADC, formation of absolute meaning of entrance bipolar signals ADC; and subsequent operation of correction of errors ADC.

However, neither in the technical literature, nor among the developers, to these operations (subsystems) is not given of sufficient attention. This testifies to necessity of realization of additional researches for this area. Therefore on our sight, the task of increase of accuracy of process of analog-digital transformation should be reduced not only to perfection of integrated microcircuits which are carrying out transformation, but also to complex increase of accuracy of process of analog-digital transformation, in view of subsystems, included in him. We are engaged with development of methods and devices of their realization directed on increase to accuracy of operations of analog-digital transformation.

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THE ANALYSIS AND SYNTHESIS OF OPTIMUM STRUCTURES OF ANALOG-DIGITAL AND DIGITAL-TO-ANALOG TRANSFORMATION OF SYSTEMS OF AUTOMATIC CONTROL

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Modern discrete systems of automatic control (regulation) contains in the structure both digital (discrete). and analog (continuous) parts. For the coordination of these parts in system are used analog-digital (ADC) and digital-to-analog converters (DAC). Them metrology characteristic (first of all, accuracy) play the important role in maintenance of quality of realization measuring, managing functions of systems of automatic control and their serviceability.

Therefore our scientific research is directed on the analysis of the reasons. lowering accuracy of transformation, and development the possible ways of reduction of their influence. And then - on the decision optimum of a task and development of the recommendations on construction of effective structures of input-output of the information in systems of automatic control. With this purpose the following research problems were put:

1. Development the methods of increase the accuracy of a subsystem (process) of analog-digital transformation. The given task already is decided by development of ways of improvement of the characteristics of devices the sample and storage of entrance signals АЦП; development of a method of formation of absolute meaning(importance) of entrance bipolar signals ADC; perfection of methods of correction the errors ADC; theoretical and experimental researches of the offered technical decisions on perfection of process of analog-digital transformation.

2. Development the methods of increase the efficiency of a subsystem of formation the supporting voltage for ADC and DAC on the basis of development the methods of formation the supporting voltage and technical decisions precision, thermo-constant and not much noise the sources of a supporting voltage.

3. Development the methods of increase the accuracy of a subsystem (process) of digital-to-analog transformation.

4. Synthesis of optimum structures of input-output of the information in systems of automatic control on the basis of development the method of structural - parametrical synthesis of complex system and decision optimum of a task.

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RESEARCH OF DETERIORATION AND PRODUCTIVITY OF A BAND SAW

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In the given work specific characteristics of deterioration of band saws are considered that allow to predict sawing up process and raise firmness of the tool and its productivity.

Deterioration of teeth of a band saw on a back surface was measured in process of experimental sawing up material in diameter by 160 mm, which was steel 45. We applied the band saw machine model C8523 Joint-Stock Company "special design bureau ALMS" As a tool was used bimetallic band saws of firm "Rongen" in height of 27 mm with variable step of teeth at length of 25,4 mm As applied 10 % of a solution emulsion.

The band saw has many teeth which of them cut only small part in time of cutting. Sawing up by a band saw is one of the most effective ways of cutting considering distribution of heat and effort of cutting.

Deterioration of teeth of a band saw is typical to the mechanism of deterioration of other cutting tools. And still deterioration occurs in unusual way. Teeth wear out in the localized zones - on a back of a tooth and on its lateral surfaces where the tooth contacts to a processed material. At definition of firmness intensity of deterioration of a band saw is the most convenient for defining at measurement of deterioration of teeth on a back surface. Deterioration can be divided into three zones: a zone extra earnings, an operating conditions and a zone of critical deterioration during which time it is necessary to replace a saw.

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RATIONALIZATION OF SECONDARY POWER SUPPLY

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Single phase secondary power supply (SPS), thanks to small weight/torque ratio (kg/kW) and quick response time, has found widespread use in a range of capability from tens W (home video) to several kW (electrical constant-voltage regulator, electric arc welding sets and so on).

One of the essential disadvantages of SPS is low power factor (PF). By using a power factor corrector of modified algorithm of operating it, which allows PF up to 0, 95 and more [1], this issue can be considered solved. The following rationalization of SPS in terms of, for example weight/torque ratio decrease and wastage decrease has the following restrictions:

- because of asymmetry of output strain of a chopper power isolation transformer is fulfilled with an airspace in the core and is used only at a private loop, that makes ineffective two- cycle bridge scheme of a chopper in comparison to single- cycle, and eventually leads to transformer overall factors increase.
- increase of output strain frequency of a chopper allows to decrease size of a transformer and smoothing inductor. However, wastage in power transistor is increased. The last is especially essential for powerful SPS.

Including capacitors successively in a chain of power transistor primary coil allows excluding constant constituent in output strain of a chopper and in some cases decreases commutation wastage in power transistors.

Using semi-bridge transistor choppers with capacitors in a power chain for SPS provides two-cycle mode of transformers while there's no constant constituent in a stress curve. This allows using a core without airspace and with high extent of rectangularity of a loop. As a result transformer's size and wastage in it may be decreased (with the same frequency) in 2-4 times in comparison to schemes without capacitors. The advantage of this solution is also simplicity of a chopper power part (two-cycle mode is achieved only by two power transistors). Correspondingly, operating system is simplified.

A bridge scheme, as well as semi-bridge, allows two-cycle mode of a power transformer and its whole usage. There are twice more power transistors and output channels of chopper operating system in this scheme, but there's only one commutating capacitor.

The two considered SPS schemes with capacitors in power chain are identical by its external characteristics, however bridge scheme (except for low power SPS) is more preferable than semi-bridge.

Including capacitors into chain of primary coil of chopper power transformer gives an opportunity to use the core of the transformer without airspace and with little excitation current and with the use of the whole loop that allows essentially decreasing its size. Natural external characteristic of capacitor choppers has lineal part with rigidity determined by total resistance of SPS and a section with load constant power. The lineal part may be, for example, used for welding in carbon dioxide, and section with constant power is ideal for welding in the air. Moreover, capacitor's real doubling of rectified voltage amplitude simplifies