SYSTEM APPROACH to TEACHING the FUNDAMENTALS of POWER ELECTRONICS

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Abstract. In the report the technology of construction of the unified approach to all types of converters of electrical energy is considered. The task of conversion is modelled by the task of approximating. The method of the analysis is advanced by an authoring direct method, the computer models of converters are created, the three-level testing of the students is constructed.

Keywords Teaching method, power electronics, direct methods.

The need for the new engineeres in a power electronics for the nearest years in West is evaluated in 100 000 persons under the data of the experts PELS IEEE. It will require tens thousand refreshed tutorials. The known tutorials on a power electronics (N. Mohan etc. (1995), M.H. Rahid (1993), Ph. Krein (2000), R.W. Erickson etc. (2001), R. Lappe etc. (1991) - in Germany) are based on a pragmatical analysis of the used schemes of converters and at all types of converters do not cover. It is not so enough of it for training of the tomorrow's experts.

The mentality of the Russian higher education is more oriented to fundamentality basing on the comprehensive approach to studied technical systems and priority of the theory. It allows by the unified approach to envelop all diversity of known and new particular technical systems.

The common concepts, that fixed in the fundamentals of our approach to teaching of a power electronics [1], which will be completely realized in the third issuing of the textbook, following:

1. The process of conversion of electrical energy is interpreted as process of approximating of the given output form of voltage, (current) of the converter by a series set from the class of functions presenting voltages (currents) of conversed electrical energy.
2. The electronic converter is considered as the commutator of functions from the given input class. Set of commutators are finitly..
3. The control is considered as a procedure determining the moments of switching of the commutator, with the purpose of minimization of an error of approximating.
4. The analysis of electromagnetic processes is done by authoring direct methods (without the solution of differential equations), that allows to receive final design formulas.
5. Each section of the tutorial is supplied with exercises and problems (in electronic version of the textbook - three-level tests permitting to evaluate knowledge, skill and creating of the student).
6. The main theoretical outcomes of the analysis are checked up by computer simulation of the base schemes of converters in the original program PARUS-PARGRAPH of our department. principal.

Reference

1. Zinoviev G.S. Fundamentals of Power Electronics. 2-edit. Novosibirsk, NSTU, 2003, 664 p.