

CLASSICAL THEORY OF CONTROL AS IMPORTANT SOURCE OF THE MANAGEMENT DECISIONS

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Abstract – The teaching experience of discipline "Theory of Automatic Control and Regulation" for engineers in the technical university is described in the paper. It is shown that in present conditions the transformation of this course in a rate on public systems management for practical using by young leaders is required. As an example, characteristics of systems with delay are considered. The example shows a methodology of problem of control quality increasing decision.

1. INTRODUCTION

In this day and age, when technical progress is basically defined by development of engineering knowledge, a problem of control quality increase in complex technological manufacture is arisen. Our life does not depend on how we work, but how we have been controlled [1]. It is turned out that production control is not only engineering, but also the people relations during manufacture. On quality of these relations the quality of production is depended in many respects. But in order to learn control, it is necessary to have a few of extra skills and to use knowledge from those rates, which delivered in technical university.

Course "Theory of Automatic Control and Regulation" or its analogues as "Cybernetics", "Automatic Control Systems", "System Dynamics and Control Engineering" and similar is presented into the educational plan of any speciality of technical university and provides to study of the classical theory of control, formed to middle of last century. It is common knowledge that theory of the linear (less – nonlinear) differential equations is mathematical basis of classical theory of control. These equations are good mathematical model of system of any physical nature. So with the equal success on the basis of the same models is possible to study the law of control of any objects of nature and societies. Norbert Wiener wrote about it from

way back in his book on cybernetics. But there are many people which consider that dynamics of control by natural and social objects is essentially various, though the distinctions can be due to complexity of systems.

The generality of politics did not study the theory of control and did not know it. Those of them, who studied, does not connect this knowledge with decision of problems of social life. Many managers declared that they feel it intuitively, but in fact try to make "experiments" on the people, easy bringing its to poverty and ravaging. No wonder: intuition is a bad adviser in questions of theory, which it is needed to know.

2. PROBLEM OF CONTROL QUALITY INCREASE – IS KEY TO LIFE QUALITY INCREASE

In the first, quality of the social life defines by control. Interesting and useful analogies in controllable of systems of the various physical natures are considered for example, in [1–3] and hundreds of other works appeared before, however to understanding of the public value of control theory the researchers have suited just now. Regrettably, in connection with change of social-economic conditions the researchers have not time to release of the control problems, but mistakes in practical leader activity costs a bomb.

Unfortunately, majority of the present leaders can not and do not want to adapt for a new conditions of control. So it is necessary to attract in control the young engineers more actively, which have necessary knowledge and are capable adequately situation and quickly to accept the decisions. It can be very simple to prove.

3. BRAKES AT AUTHORITY

In the general theory of control each conclusion is proven mathematically, rather than at level of "verbal inspiring". It becomes possible because of physical, biological, chemical, and the social systems are mathematically described by same differential equations.

For description of "decrepit management" problem the following most simplify model is possible to use. As far as the social systems, as a rule are aperiodic and astatic with feedback, the following structure control scheme (fig. 1) can be offered.

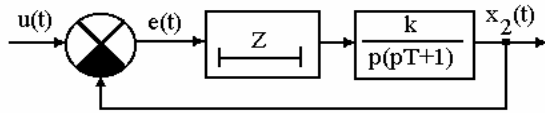


Fig. 1

Control in the system is carried out by the delay time element Z [4], which simulates a leader taking management decision, when need for it already falls off, but other decision is required already, which will also be accepted with delay. The system of differential equation for fig. 1 is following:

$$\frac{dx_1(t)}{dt} = \frac{ku(t) - kx_2(t - Z) - x_1(t)}{T};$$

$$\frac{dx_2(t)}{dt} = x_1(t),$$

We shall solve it for the test effect $u(t)=1(t)$ and define an error of control:

$$e(t) = u(t) - x_2(t).$$

The results for $k=100 \text{ sec}^{-1}$, $T=0,1 \text{ sec}$ are indicated on the fig. 2.

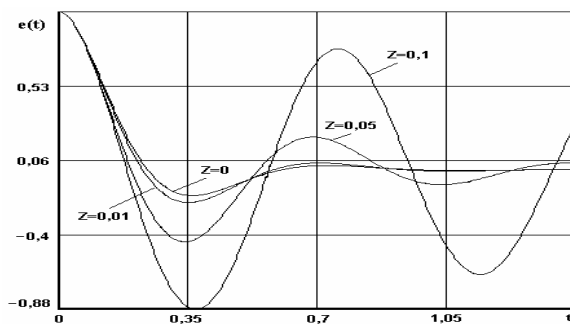


Fig. 2

It is visible that even weak delay brings to increasing the error of control. For $Z=0,01 \text{ sec}$ that in ten times less of the time constant T , error is essentially increased, for $Z=0,05 \text{ sec}$ it exceeds initial twice, at $Z=0,1=T$ – threefold, at the greater value of delay the system becomes unstable and uncontrolled. Besides the system

risetime does not change greatly. As politics said, crisis comes in.

4. EDUCATION AS DECISION OF PROBLEM "BRAKES AT AUTHORITY"

Now it is obviously for many people that the life quality of society is defined by quality of education. Especially it appreciably in field of management and control. In this connection a change of the educational programs of control' courses is necessary to train the competent specialists, which does not make an elementary mistakes and able to foresee consequences of their own decisions.

Author's experience shows that many students does not use knowledge, received at study of one disciplines of educational plan for study of other disciplines. The similar situation is observed also at study of the theory of control, which is based on the high mathematics and theory of circuits. No wonder that society and state control is perceived as "blackening magic" at the best, as intrigues of policies in the worse. Explanation of the social-political phenomena, their prediction and prescience of their consequences is completely impossible also. Last researches show that young engineers use naive and pseudo scientific concepts when they required to explain the even simple problems of the social life. But when they see that it is not only possible, as well as mathematically provably, it makes strong impression.

5. TEACHING

Experience of teaching the classical theory of control in the Tomsk State University of Control Systems and Radioelectronics has shown gradual reduction of student's enthusiasm when studying of educational disciplines. However any changing of the lecture material contents the part of increase of volume, concerning of social-political life, results in reasonably large revival of audience and appearance many questions not from excellent, but also of weakly training students. After studying of discipline many students said that they have hears the clear and proven explanation of all phenomena in society life for the first time. Unfortunately it does not occurs everywhere and frequently too late.

6. IEEE BENEFITS

Now in the IEEE there are all necessary conditions for increase of administrative knowledge level of the young engineers. Mainly

it is possible to consider a work in student branches and GOLD affinity groups. "It is impossible to be learned anything practical from the books", wrote Henry Ford in his memoirs. It is applied to practice of management and control. The young engineer, actively participated in the IEEE events and worked in student branches can receive excellent experience of planning, management, and holding various scientific, technical, and social meetings. Therefore he has more advantages, than many others. Highly important acquisition is invaluable experience of management by student branch, that will certainly helps in the further professional work.

We guess that some next additional things will promote activization of branches and GOLD groups work.

1. Financial support for Chapters with the purpose of organization and holding of various events, meetings, advertising campaigns, partial reimburse and subsidies for remembrance and attraction in IEEE especially to the outstanding students.

2. Formation of the regional financial programs especially for students and GOLD, because of young specialists more than employees are susceptible to new ideas and IEEE programs. It is very important for establishment of professional contacts without heavy financial problems. The experience of Soros' foundation demonstrates expediency of such work form in regions.

7. CONCLUSION

Dominating at present in higher education system the program and strategy of economy and sociology teaching avoids consideration of social-economic processes with attraction of control theory, and for this reason does not see or can not describe and to realize many highly transparent phenomena in the social life, including its economy. Experience of teaching the discipline "Theory of Automatic Control", participation in management of TUCSR and research of social systems results the conclusion about administrative powerlessness of nowadays leaders. Quality of life can increase only following generation of managers and politics. In order to they did not repeat errors of predecessors, it is necessary the wide study of general theory of control by social systems.

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