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Ideological and Political Construction of Control Theory for Mechanical Engineering

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Abstract

After the speech of General Secretary Jinping Xi at the symposium on ideological and political theory in schools, the Party and the State have made new requirements for establishment of moral education and put forward requirements on the construction of ideological theory and college curriculum. Control theory for mechanical engineering is one of the main courses for students of mechanical and electric power majors, and it is the foundation for students to continue to study the direction of control, and it plays an important role in students' engineering practice and other professional courses. In order to achieve the task of establishing moral education, universities should take the theory of mechanical control as an important position for students' thinking and political construction. The course knowledge points, practical cases and political education are combined to strengthen the knowledge practice and accomplish the task of moral education at the same time.

Keywords: Control Theory for Mechanical Engineering, Civic Education, Moral Education, Ideological Element.

1. Introduction

Economic development and technological progress cannot be achieved without talents, and most of the talents nowadays come from colleges and universities. During the study period in colleges and universities, young people's minds are not yet fully set. Therefore, when training talents in colleges and universities, they need not only to cultivate their professional skills, correct study habits and ways of thinking, but also to help them establish moral concepts and cultivate their patriotic enthusiasm. [1].

Control theory for mechanical engineering is one of the main courses for mechanical and measurement and control students in our university, and it is also the basis for other control courses. Nowadays, control technology has a wide range of roles in various fields of life, such as missile guidance (The missile guidance process is shown in Fig 1), automatic vehicles and other fields, and also can be applied to the detection of underground mines. Control engineering has a wide range of applications, but it is also more difficult to learn. Because the textbook contains a large number of formula symbols, control signal changes cannot be visualized by students, which leads to a high degree of abstraction of the course content, making it much more difficult to teach. Moreover, students can only learn some theoretical theorems, but they cannot understand substantive problems better.

In order to respond to the national call and adjust the students' learning status, it is necessary to integrate thinking and political education into the course, and cultivate the students' correct way of thinking, practical ability and good learning habits. In order to do so, we need to focus on the construction of "Control theory

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for mechanical engineering", analyze the political elements in the course of "Control theory for mechanical engineering", analyze the key points of political thinking in different chapters of the course, and educate students in the process of teaching knowledge. At the same time, some domestic and foreign control cases can be integrated with the main points of the course, and the concept of thinking and politics can be conveyed through vivid stories, so as to achieve the effect of silence.

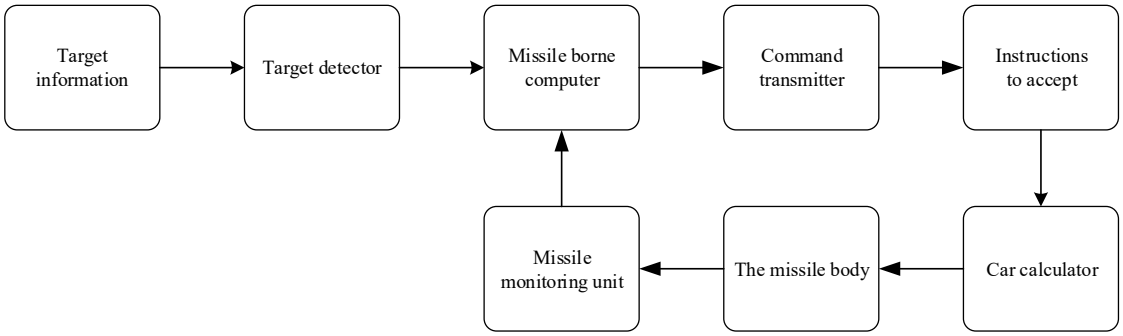

Fig.1 missile control system

2. Objectives of course construction

It is the fundamental requirement of moral education, which requires teachers to deeply explore the ideological elements in the course and combine the invisible values with teaching practice in the teaching process, so that students can not only learn relevant knowledge and cultivate relevant ability, but also establish the correct three views [2]. In this paper, according to the characteristics of the course "Control theory for mechanical engineering" and the relevant control engineering cases, combined with the requirements of General Secretary Xi Jinping to establish moral education, the objectives of the course are as follows:

Cultivate students' patriotic feelings. We take control of technology as the basis of the course teaching, and through the comparison of domestic and foreign related technology, we can see the advantages and shortcomings of domestic and foreign related technology, so as to stimulate students' patriotic enthusiasm, combine their own development with the country's strength, and make it a motivation for students to continue to advance.

Cultivate the spirit of struggle among students. In the course of the construction of the course of thinking and politics, the "two hundred years' goal" is used to lead students to establish the ambition of aspirations and inherit the spirit of struggle. At the same time, we can also dig deeper into the excellent Chinese traditional culture in the curriculum to foster the students' struggle character and stimulate their inner spirit of struggle. Students will be trained to strive for the realization of the "Chinese Dream" and the inheritance of Chinese traditional culture [3].

Strengthen the construction of students' ideology and morality. Because of the influx of various western undesirable cultural trends into China, China's network ideological and cultural positions have been impacted, and college students' thoughts have been poisoned by western undesirables, so teachers should strengthen students' moral construction in the course of course education. And through some actual cases of control, let students deeply understand the spirit of the former experts who constantly struggled and served the country and the people, which would invisibly arouse their sympathy and strengthen the students' ideological and moral construction.

Enhance students' comprehensive literacy. Since students nowadays are educated to the test from childhood, this leads to their stereotyped way of thinking. They only know half of the knowledge, or only at the end of the sudden attack, so the students nowadays have low comprehensive quality. In order to cultivate the new generation, teachers should try to train students comprehensively and improve their overall quality. In the process of practice of the corresponding courses, we promote the combination of theory and practice to achieve a deeper understanding of the curriculum and enhance the practical skills of students, so that they can become all-round talents.

Enhance students' sense of innovation. Control engineering is mainly used to deal with various control problems in automatic control systems, through the relationship between the internal and external inputs and outputs of the system to control, to make the control system more efficient and accurate. Control engineering is widely used in modern industries, and with the continuous progress of modern science, control methods are constantly being innovated to promote the progress of society through the application of engineering. Therefore, control engineering and the sense of innovation are inseparable, and the cultivation of students' professional knowledge should also focus on the cultivation of the spirit of innovation.

In the process of construction of the Civic and Political Science course, the above objectives are taken as the direction, and the corresponding elements are integrated into the teaching process, so as to cultivate professionals while paying attention to the cultivation of other abilities and achieve the purpose of teaching and educating people.

3. Curriculum building measures

First of all, according to the specific objectives of the course Civics and the design of the syllabus, the content of the course Civics of Control theory for mechanical engineering should be combined with the knowledge in it, and the objectives of the course Civics should be accomplished in the process of teaching knowledge.

The second is to play the leading role of teacher [4]. In order to achieve the goal of moral education and help students to establish correct moral concepts, teachers with both moral and intellectual ability are indispensable. They are role models for students, and they are irreplaceable in cultivating students' ability and morality. Only when teachers have the right outlook and high moral character can they set a good example for their students and produce better students. Therefore, professional teachers need to constantly enhance their political literacy and be people with a sense of family and country, so that they can better lead students and help them improve their moral qualities.

Teachers in colleges and universities not only need to teach knowledge and academics, but also need to help students solve their doubts about the direction of their lives. However, nowadays, most of the teachers in colleges and universities stay on the first two levels, focusing only on the teaching of professional-related knowledge, but not on moral cultivation. Students' three perspectives are mainly established during their college years, and spiritual moral shaping is more important. Therefore, teachers in colleges and universities should pay attention to the relevant educational laws and make moral education an important part of teaching.

Teachers should also pay attention to the cultivation of academic style. At present, many students play games or sleep in class, which not only affects the learning of professional knowledge, but also affects ideological education. Therefore, teachers need to pay attention to students' learning status, actively interact with students, tell some relevant people's examples to attract students' attention and carry out ideological

education at the same time. For students who often play with cell phones or sleep, teachers should carry out targeted education. Only after the students can listen to the lecture will the ideological education be successful.

4. Course Civic Content

The main content of this course is the concept of control system. And the performance analysis of control system, and the theory of improving the accuracy of control system, and some course experiments are also taught.

Therefore, it is possible to find the material for thinking and education from the course around the goal of the construction of thinking and politics (The process is shown in Fig 2) [5].

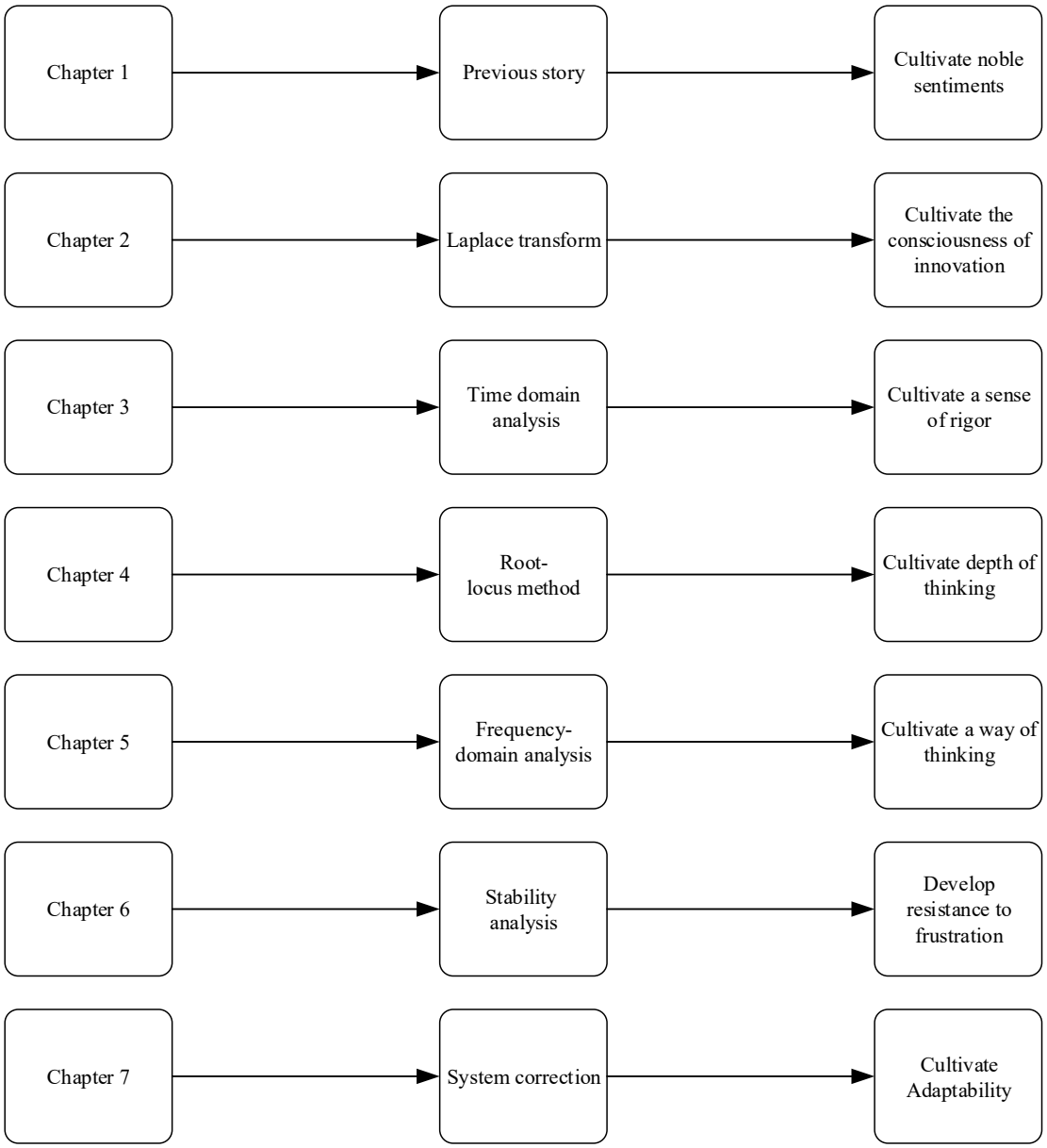

Fig.2 Chapter points

(1) Introduction. This chapter mainly talks about some basic concepts. Students are required to master the classification of control system and the basic requirements of control system (fast, accurate, stable), so that students have a general understanding of control engineering. The ideological education of this chapter can be carried out from the origin and development of control engineering. And through the introduction of some famous people, students can know their important contributions to the development of the discipline and learn from them their noble sentiments of loving their jobs and loving their country and family [6]. Civic education can also be carried out in the form of systematic feedback, teaching students to analyze themselves using the principle of feedback. When students make progress, let them know how they progress through analysis; when students regress, they can analyze how they regress and correct them in time to prevent negative feedback.

(2) The mathematical model of control engineering. This chapter is mainly about system control equations and their simplification methods, requiring students to master the Laplace transform and Laplace inverse transform, transfer function and its method, the simplification of the system block diagram and open-loop closed-loop transfer function. When talking about the Laplace transform, introducing the Laplace's discovery and the process of creating Laplace's change could highlight his spirit of innovation and creativity, so that students can have a sense of. By the example that different physical problems can be mathematically transformed into the same formula, students are taught that although things in nature are different, they are the same in some aspects [7].

(3) Time domain analysis of control systems. This chapter focuses on the analysis of several control systems, the error of the system and methods to improve accuracy. Students are required to be able to analyze the time domain response of the system on the basis of the known control system model when the input signal is used. They also need to master the second-order system and the first-order system in various damping conditions of the unit step response, which could be able to find its performance index and be analyzed. Finally, the concept of steady-state error and its method, to master the method to improve the accuracy of the system. This chapter of Civic Education can train the students to work on the length of response time of the system under different damping conditions. Students will be taught to find the correct method to do different jobs and to improve their efficiency while will ensure the correctness of the results[8]. Students can also develop their attitude by improving the steady-state accuracy of the system, so that they know that a difference of a hair is a thousand miles, and that they should work with a rigorous attitude to ensure the accuracy of their work.

(4) Root trajectory method. This chapter is about the basic concept of root trajectory method, the basic method of drawing root trajectory method and understanding the four levels of application of root trajectory method in engineering. Students are required to master the nature of root trajectory, phase angle and amplitude conditions. In this chapter, students are taught not only to look at the surface conditions but also to analyze them deeply to get the core conditions [9].

(5) Frequency domain analysis of control systems. This chapter mainly talks about the frequency domain characteristics of different systems and the drawing of their coordinate diagrams. Students are required to be able to solve the frequency domain conditions, master the drawing of logarithmic diagram, and be able to analyze the frequency domain indicators. The Civic Education of this chapter can be carried out from the drawing of the Porter diagram, by explaining the characteristics of the coordinates of the Porter diagram, letting the students know that they should be flexible when studying the problem, and that the final result of the problem can be found more simply by making suitable changes to certain data, and teaching the students to think more flexibly about the problem.

(6) Stability analysis of the control system. This chapter explains how to determine the stability of the system, the Rouse criterion, solving the phase amplitude and phase margin. Students are required to master the system stability of the sufficient conditions, Rouse criterion use. The ideological education in this chapter can be carried out from the system stability. By explaining the stability of the system, students will realize that they themselves are also the system, and teach them how to face frustration.

(7) Synthesis and calibration of control systems. This chapter deals with control system indicators, methods of system calibration. Students are required to master different methods of calibration and determine the settings of calibration device parameters. The mindfulness education in this chapter can be carried out from the method of system calibration. When explaining the calibration of the control system, you can intersperse some ideas of adjusting the mentality, so that students can be more optimistic and adapt to different situations more easily [10].

(8) This course also has practical links. Through course practice, students not only can deepen theoretical knowledge understanding at the same time, but also can strengthen practical hands-on ability. And in the process of operation, it can also let students know some operating rules and industrial requirements.

5. Conclusions

According to the teaching method, content and purpose of "Control theory for mechanical engineering", combine the relevant knowledge of control engineering and Civic Education closely, dig deeper into the control elements in Control theory for mechanical engineering, and at the same time cultivate students' family sentiment. Combine control engineering with daily life, cultivate students' three views and enhance their patriotism and professionalism. In the teaching activities, we play the leading role of teachers, pay attention to the cultivation of academic style, and carry out excellent academic style and ideological education at the same time, not only to cultivate students' professional ability, but also to cultivate them into the new generation with strong patriotic sentiment.

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