

Research on Course Teaching of the Motion Control System Based on Task driven Teaching Method

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Abstract

Motion Control System is an important elective course for the high grade students of automation specialty. This course relates to discipline knowledge contents of the power electronic technology, motor drive foundation, automatic control theory etc. This course is more difficult and more comprehensive. In this paper, we discuss the way of applying the Task Driven Teaching Method of the Motion Control System course teaching process. The results confirm that this method can improve students' learning interest and cultivate students' ability to solve practical problems.

Keywords

Task Driven Teaching Method; Automation major courses; Motion Control System.

1. Introduction

Task driving teaching thought can be traced back to the Chinese education originator Kong Fuzi in 2000 years ago, the idea of "learn in order to practise"; Its embryonic form is in the last century 50, 60 time in West Germany in the prevalence of "case teaching" model. "Task driven" is a kind of teaching method based on the theory of Constructivism teaching. Usually refers to in the process of study information technology, the students in the teacher's help, closely around a common task activity center, in the strong problem motivation, through the active application of learning resources, to explore and learn with interaction, to complete the task at the same time, guide students to improve practical ability.

Motion Control System course is an important elective course for students of high grade students, and difficult to learn. So we often use a variety of teaching methods in the teaching process, the most effective teaching method is the Task Driven Teaching Method. This method has been avoided, monotonous teaching, and it is very good to mobilize the initiative of students learning. Cultivate the students' practical ability.

2. Examples of Task Driven Teaching Mode for Motion Control System

Fig.1 shows the knowledge structure of Motion Control System. Taking DC speed regulation system as an example, this paper gives the concrete implementation strategy of task driven method in the course of motion control from the angle of control link.

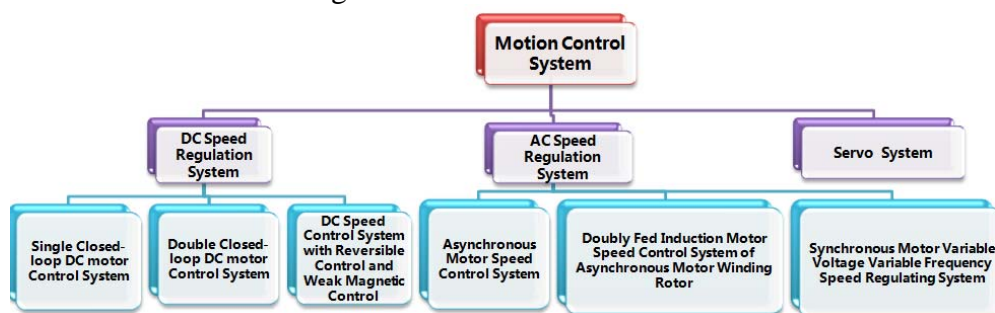


Fig.1 Knowledge Structure of Motion Control System Course

2.1 Single closed loop DC speed regulation system.

First of all, the paper analyzes the knowledge context of the single closed loop speed control section, and the task to be set up to cover these contents. Fig.2 shows the main points of knowledge that are included in this section.

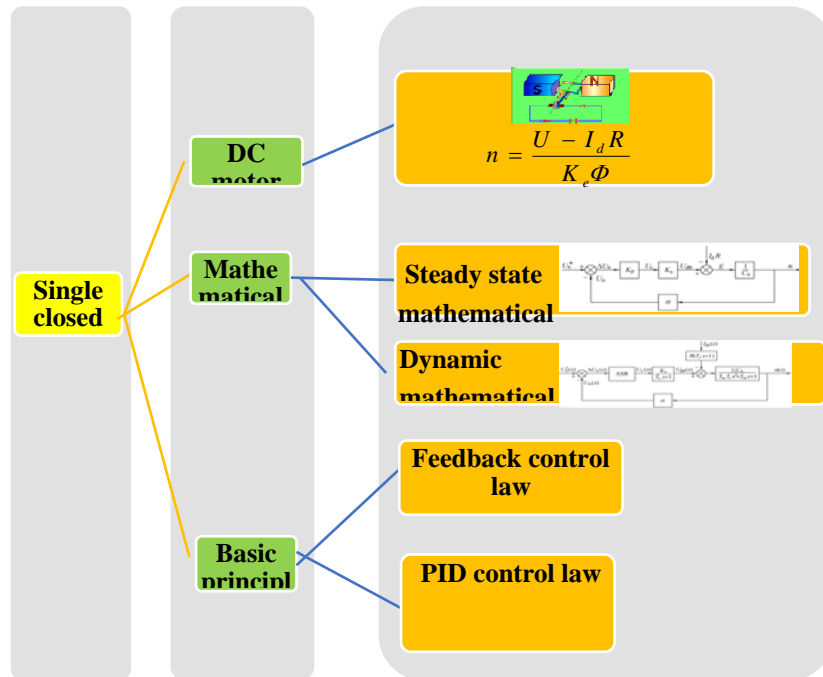


Fig.2 Knowledge points of the single closed-loop DC speed regulation system with the task required. We give the specific tasks as shown in Fig.2, let the students complete the simulation design according to the specific parameters, and to guide students to learn the knowledge points shown in Fig.2 as the task implementation .Set up the task situation, and guide students to understand the fact that open-loop system can not meet the system requirements, and then set up a single closed-loop speed control system model, and finally establish the simulation model, the simulation results obtained. Complete this part of the teaching in the way of the teacher and student’s interaction.

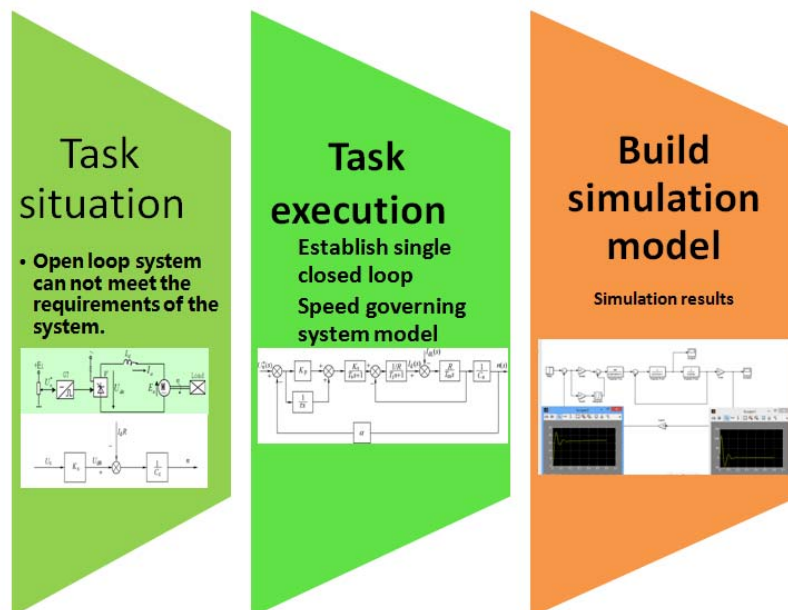


Fig.3 "Single Closed-Loop DC Speed Regulation System" Task Implementation Process s

2.2 Double Closed Loop DC Speed Control System

The limitation of the single closed loop speed regulation system is obtained by analysis the ideal starting and braking process. The relationship between the current and the torque is explained.It can

be concluded that the indirect control torque can be achieved by controlling the current. Then guide the students to think how to build a double closed loop speed control system, obtain the composition and stable structure diagram of double closed loop speed control system. On the basis of the steady state structure diagram of the double closed loop speed control system, the dynamic structure diagram is obtained. And then analyze the dynamic process of the double closed loop speed control system. Compared with the ideal starting process, the system can meet the requirements of the ideal start. The engineering design method of the converter is introduced, the task situation is introduced, and the practical design of the controller and the system is designed. Build a double closed-loop simulation model, simulation, so that students to verify the design effect. The overall block diagram of the teaching process is shown in Figure 3.

2.3 DC servo system

The implementation components of DC servo system are DC servo motor, the small power servo system using DC permanent magnet servo motor, when the power is large, but also could use electric excitation DC servo motor. Brushless DC motor and DC motor have the same control characteristics, can also be classified into DC servo system. The knowledge content of the double closed-loop DC speed regulation system, and the position loop, the position servo system is formed. Can let the students complete the process.

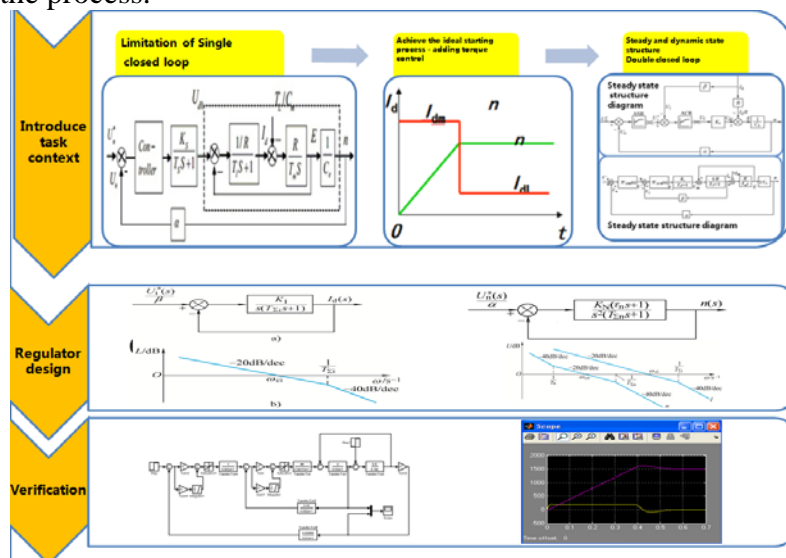


Fig.4 "Double Closed Loop DC Speed Regulation System" Task Implementation Process

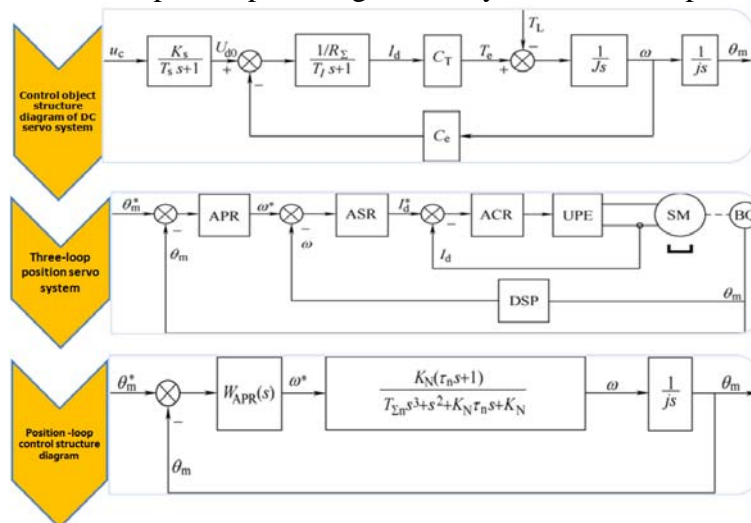


Fig.5 Task Execution Process of DC Servo System

3. Conclusions

Task-driven, need to complete a number of tasks associated with the discipline to learn and develop skills. Task teaching method is very suitable for the specialized course teaching process of Motion Control System. Task based teaching method is beneficial to the students' knowledge system of Motion Control System. Facts have proved that the task driven teaching method can get better teaching effect.

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