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Application of Multisim in the Teaching of Electricity in Senior High School

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Abstract

Physics is a science based on observation and experiment. Introducing Multisim into the teaching of physics and electricity in senior high school can not only overcome the shortcomings of traditional teaching, but also improve the quality of teaching. In this way, students can understand and master the theoretical knowledge, stimulate their interest in learning, and cultivate their practical ability and innovation awareness. At the same time, it will add vitality to the new teaching methods of physics class and experiment under the new curriculum reform.

Keywords

Physics, Multisim, capacitance.

1. Difficulties in Traditional Electrical Knowledge Teaching

Physics is a science based on observation and experiment. Electricity is an important part of high school physics curriculum. For a long time, the classroom teaching of electricity is the combination of hardware circuit experiment and blackboard writing to explain knowledge. Because of the long debugging time, poor visibility, low accuracy of data reading and calculation, low efficiency of teaching, and the limitation of experimental instruments, the experiment can not be constructed. If teachers do not deal with it properly, classroom teaching can easily turn into theoretical teaching, which leads to students' doubts about the knowledge conclusion and is difficult to understand and master. At the same time, the traditional practice teaching link is to let students enter the laboratory and operate according to the teacher's guidance requirements, unified method steps and established instrument conditions in a fixed teaching time . This is not only not conducive to students' further understanding of physical knowledge and mastering physical laws through experiments, but also not conducive to stimulating students' initiative and creativity, and cultivating students' ability to find, analyze and solve problems. Therefore, it is very important for teachers to choose effective experimental means and methods for teaching in order to improve the quality of teaching.

2. Introduction to Multisim

Multisim is a special tool software for electronic circuit simulation and design. Multisim's advanced circuit simulation and design functions are not available in many other EDA software at present. The software is mainly based on graphical interface, and adopts the combination of menu bar, toolbar and hotkey. It has the interface style of general windows application software, and it is convenient to operate, especially a variety of virtual instruments that can be placed in the design circuit, so that the circuit simulation analysis operation is more in line with the working habits of engineering technicians. Applying Multisim to physics experiment teaching in senior high school can make the teaching process more vivid and easy for students to understand and accept. In addition, because Multisim has the advantages of intuitive graphical interface, rich components, strong simulation ability, rich testing instruments and complete

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analysis means, it can not only make the experimental teaching convenient, but also solve the problem of lack of experimental equipment to a certain extent, so as to solve some problems in the electrical experiment in the virtual environment, and expand the electrical experiment It's all there is to it.

3. The Application of Multisim in Electrical Teaching

Capacitor is a kind of passive device which stores energy in the form of electric field.It exists in almost all electronic circuits, and can play a variety of roles, such as isolating direct flow AC, coupling, bypass, filtering, tuning, etc. Capacitance has always been an important teaching content in high school physics teaching, but also a teaching difficulty. Students can't see the change of charging voltage, charging current and discharging current with time.As a result, it is not easy for students to understand the two physical characteristics of capacitors. And the definition of capacitance in the textbook is given by ratio method, and then the decisive factors of capacitor are discussed in the experiment, which increases the difficulty of learning and understanding in knowledge logic. In this paper, Multisim Simulation Tool will be used to introduce it into classroom teaching, so that students can grasp the capacitance knowledge more intuitively and vividly.

Charging: the charging process is the process in which the capacitor stores the charge. When the capacitor is connected with the DC power supply, the charge on the metal plate connected with the positive pole of the power supply will run to the metal plate connected with the negative pole of the power supply under the action of the electric field force. This causes the metal plate connected with the positive pole of the power supply to lose the positive charge, and the metal plate connected with the negative pole of the power supply to get the negative charge, and the capacitor starts to charge. The charge and discharge of capacitance are related to resistance R and capacitance C. The simulation circuit is shown in Fig. 1.

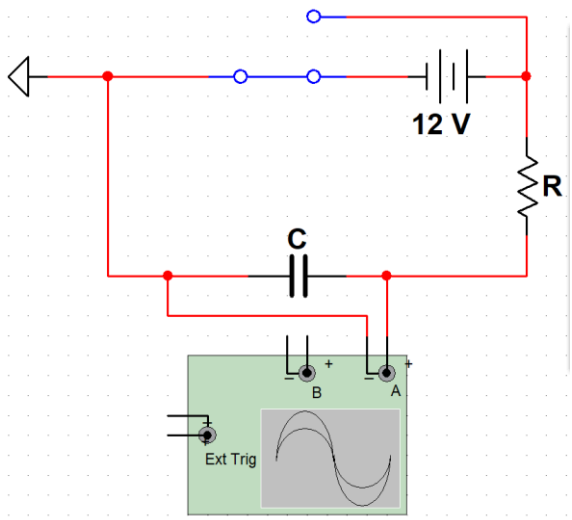

Fig 1. Capacitance simulation diagram

Fig. 2a shows the charging diagram when C = 10uF R= 1K Ω.Fig. 2b shows the charging diagram when C = 10uF R = 5K Ω.Fig. 2.c is the charging diagram when C = 10uF R = 10K Ω.It can be seen from Fig. 2 that the charging time t of the capacitor is proportional to R, and the charging time will increase with the increase of R.

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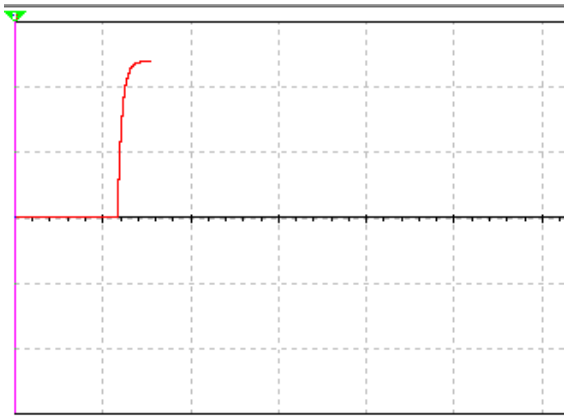

Fig 2a. Charging diagram when C = 10uF R= 1K Ω

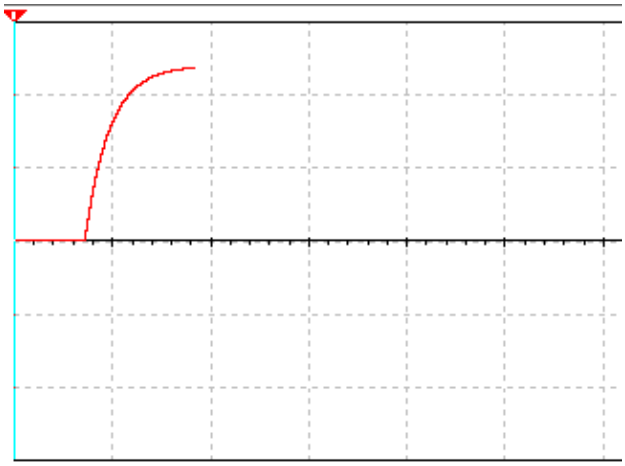

Fig 2b. Charging diagram when C = 10uF R= 5K Ω

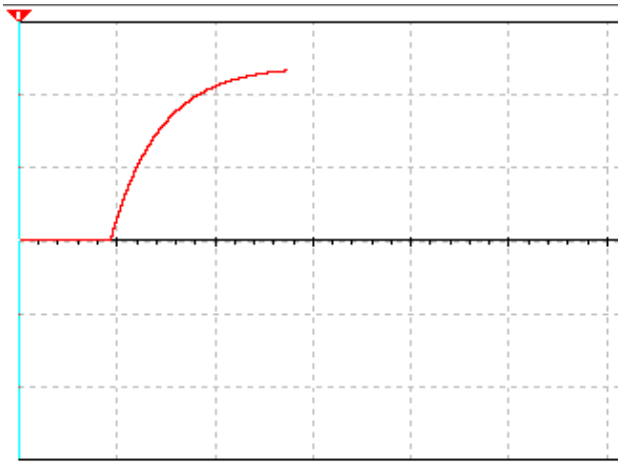

Fig 2c. Charging diagram when C = 10uF R= 5K Ω

Fig.3a shows the charging diagram when C = 1uF R= 10K Ω.Fig.3b shows the charging diagram when C = 5uF R = 10K Ω.Fig.3c is the charging diagram when C = 10uF R = 10K Ω.It can be seen from Fig.3 that the charging time t of the capacitor is proportional to C and the charging time will increase with the increase of C.

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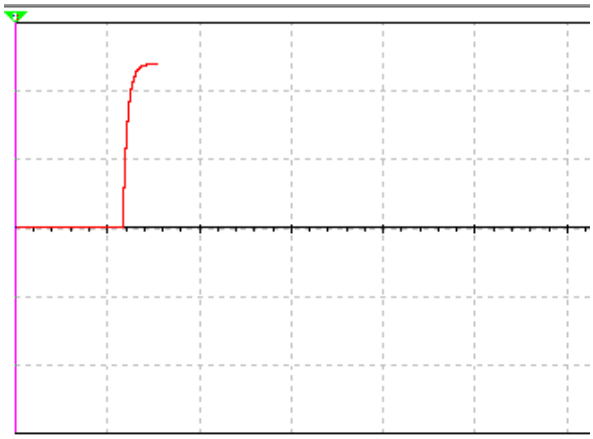

Fig 3a. Charging diagram when C = 1uF R= 10K Ω

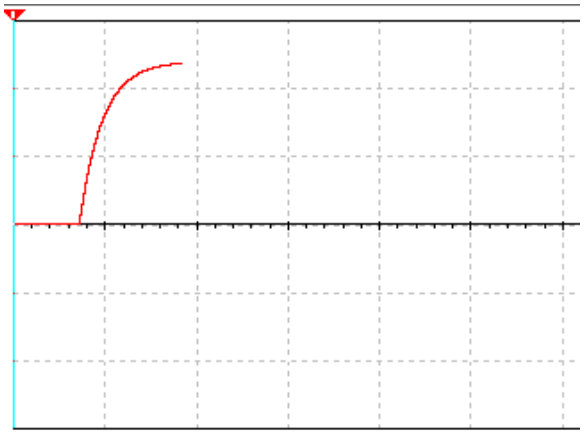

Fig 3b. Charging diagram when C = 5uF R= 10K Ω

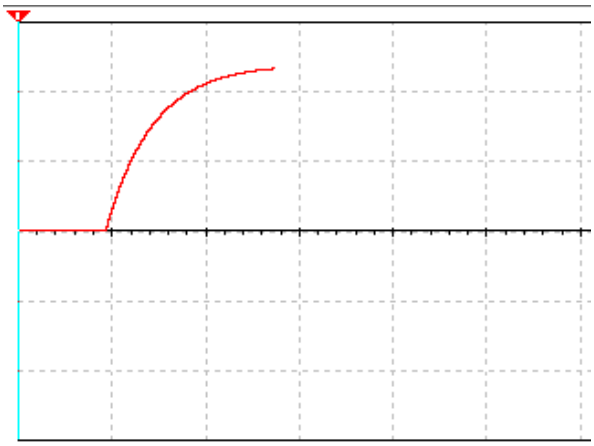

Fig 3c. Charging diagram when C = 10uF R= 10K Ω

4. Conclusion

Multisim is applied in to the teaching of physics and electricity in middle school. On the one hand, it is helpful for students to understand and understand the abstract content of teaching intuitively, enrich teaching and improve teaching effect, cultivate students' practical ability, stimulate their interest and enthusiasm in learning. On the other hand, under the requirements of the new physics curriculum reform, the use of computer simulation experiment to carry out the practical exploration of teaching methods and means provides a reference.

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