Application of Engineering Animation in Fluid Dynamics Experiments in the New Media Age

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Keywords: Engineering Animation, hydrodynamic experiment, dynamic demonstration.

Abstract: With the rapid development of computer technology and engineering animation technology, through three-dimensional engineering animation simulation demonstration of hydrodynamic experiments, reducing Cost and Consumption in Experiments, it can complete the experiment with high efficiency and quality, in the process of research, we can understand the experimental results more intuitively. With the Development of Network Computer Technology in the New Media Age, With the development of animation technology and multi-field experiments, the requirements of low cost, low consumption of materials and repeatability in the process of experiment are increasing. Engineering animation can simulate the process results of demonstration experiment, which has the characteristics of rich expression, high reliability, good sharing and not limited by geographical sites.

1. Demonstration of Virtual Experiment Using Engineering Animation in Hydrodynamics Experiment

In the new media era, animation has been developed rapidly, involving more and more fields. In addition to the widely recognized film animation, the development of Engineering animation in various fields is becoming more and more professional. For example, the use of Engineering animation in the field of construction engineering can show the appearance of buildings more intuitively and quickly. Information such as structure. In architectural design, more and more architects consider the overall effect of the structure.

Virtual experiment demonstration of Engineering animation has been well developed and applied in many fields, and engineering animation demonstration is gradually added to the experiment of fluid mechanics to show the experimental effect intuitively. Virtual experiment demonstration of Engineering animation refers to the use of multimedia means and computer to simulate and simulate the operation of traditional experiments in the form of animation demonstration. The application of virtual demonstration of Engineering animation in hydrodynamics experiment needs the help of related technology and software.

1.1 Demonstration Method of Engineering Animation in Fluid Dynamics Experiments

The content of hydrodynamics experiment is relatively complex. In the virtual display of Engineering animation, it needs to be realized by system modeling, steps of virtual experiment and demonstration of experimental results.

(1) System modeling. The professional software of animation production, 3DMAX, is used for virtual display of the model. The function of 3DMAX software is very powerful, and it can build three-dimensional geometric model of the device of each item in the experiment, and the effect is lifelike. After the first step of geometric modeling is completed, physical and behavioral modeling of the experimental process is also needed. Geometric modeling in engineering animation exhibition belongs to the previous basic modeling. It is a simple way to construct a virtual experimental scene. Through physical modeling, the virtual object in hydrodynamics experiment can be more consistent with the real object, and the viewer can be more immersed in it. Because of the particularity of hydrodynamic experiment, water is basically used in the experiment. In order to make the visual

effect more real, the state and law of water flow should be displayed in engineering animation. At this time, the particle system will be used to design the dynamic physical model of water flow and demonstrate the vivid dynamic effect [1].

(2) Web Running of Engineering Animation Demonstration Experiment

The advent of the media age makes online communication more convenient, and online viewing of hydrodynamic experiments is becoming more and more popular. After the project animation demonstration is completed, the three-dimensional experimental view is converted into multi-angle pictures by using two-dimensional software PHOTOSHOP, stored in PNG format, then imported into two-dimensional software Flash, and animated in the time axis panel of the interface, which can also achieve the three-dimensional animation display effect. The virtual experiment of energy equation and momentum equation in the whole hydrodynamics experiment can be well displayed in the web page.

1.2 Combination of Engineering Animation Demonstration and Real Experiment

In hydrodynamic experiments, the combination of Engineering animation demonstration and real experiment can better reflect the effect of the experiment. From different perspectives, we use different ways to understand experiments, understand experiments, and complete experimental training. The viewer can watch the experiment through visual animation display and then complete the actual operation of the experiment by himself, so that he can understand and grasp the connotation of the experiment more deeply.

2. Combination of Engineering Animation and Fluid Dynamics Experiments

With the development of computer technology and engineering animation design software, including three-dimensional animation, three-dimensional rendering, three-dimensional virtual reality and simulation, three-dimensional results display technology has gradually been applied to fluid mechanics. Virtual demonstration of Engineering animation has the characteristics of intuition, reality and interaction that traditional display methods do not have. The virtual demonstration of Engineering animation can satisfy many requirements. It can visually display the shape, space position, surface material and movement process of the object. It can show the key steps in the form of multi-angle and multi-dimension in the experiment of fluid mechanics. The process simulation shows that the viewer can simulate the process from different angles, but not from different angles. The purpose and significance of the observation and analysis experiment at the same level can improve the quality and efficiency of the experiment [2].

In the experiment of fluid mechanics, the virtual demonstration of Engineering animation is based on the related three-dimensional collaborative design platform software, and the demonstration of experimental results is introduced. The emphasis is on the production of three-dimensional animation, which provides practical and beautiful three-dimensional demonstration results for relevant fluid mechanics experimenters, and provides reference and main forms for the demonstration of three-dimensional results type.

3. The Form of Engineering Animation Display in Fluid Dynamics Experiments

Based on the diversity and complexity of hydrodynamic experiments, the integration of dynamic scene roaming module, scene model display module, scene real-time aging module, virtual reality technology and engineering animation module is adopted.

In the design and production of Engineering animation, we should pay attention to the combination of theoretical knowledge and engineering practice. According to the experimental phenomena, theory is combined with practice, the existing hydrodynamic experimental equipment is used for virtual demonstration, and the experimental items are displayed. For example, the flow rate and velocity of water pipes in laboratory can be measured by flowmeter and solved by experiment practical problems.

4. The Production Effect of Engineering Animation in Fluid Dynamics Experiments

Virtual reality technology is used to display hydrodynamic experiments, and animation browsing, roaming and human-computer interaction are realized by combining engineering animation.

4.1 Characteristics of Engineering Animation

The characteristics of using engineering animation to demonstrate hydrodynamic experiments can be shown as the immersion of the viewer in the virtual experimental environment constructed by the engineering animation designer; the observer can click on the interactive button to view the experiment in multi-dimension and achieve the degree of human-computer interaction; visitors can immerse themselves in simulated virtual experiments and interact with each other. On this basis, they can associate and conceive the understanding of experiments and the effects of experiments [3].

4.2 Key Points of Engineering Animation Production

The effect of Engineering animation is affected and restricted by many factors, including the accuracy of the model, the matching degree of material and so on. Some engineers and technicians believe that if the standard of Engineering animation does not need to be beautiful, if the material is free to map without precise processing, this method cannot produce good animation demonstration effect. In the process of Engineering animation production, the choice of camera perspective is very important. Angle of view cannot be set freely, a single mechanical straight line, turn around the viewer will be dizzy, boring, lose interest; reasonable and vivid choice of camera angle of view, will give the viewer a strong visual impact of the screen, produce a refreshing feeling [4].

5. Summary

The application of Engineering animation demonstration in hydrodynamics experiment is an important content of experiment reform and information construction in the new media era. The engineering animation demonstration of fluid mechanics experiment expands the experimental field, enriches the experimental content, improves the experimental level and promotes innovative display means. In the virtual animation demonstration of hydrodynamics experiments, the sharing of high-quality experimental resources can be realized in a wider range.

References

[1] Zaccone, R; Cooper, S; Dann, W. Using 3D animation programming in a core engineering course seminar.2003-06. IEEE.

[2] Fan Wu; Wang Yang; Guochao He. FDCP: cache placement model for information-centric networking using fluid dynamics theory. Peer-to-Peer Networking and Applications.2019-06. Springer journal.

[3] Neunghoe Kim; Soojin Park; Dongwon Jeong; Mansoo Hwang; Sooyong Park; Hoh Peter In. EURECA: End-user requirements engineering with collaborative animation. Software: Practice and Experience.2017-07. Wiley journal.

[4] Dandan Song. Comparison of CDIO and Chinese Engineering Education Accreditation for Animation Specialty of TUST. Procedia Computer Science.2018-06. Elsevier journal.