Application Research of Civil Engineering Construction Based on Computer Aided Design Technology

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Abstract. Information technology makes the social development experienced another major change almost covered and penetrated into all walks of life. Civil engineering design, along with its main features: large engineering design; Heavy computation; Long design cycle; High labor intensity. Information technology in the civil engineering design development, and gradually produced a variety of computer-aided design technology, successfully solved the difficulties, making the civil engineering design difficulty greatly reduced. It can be seen that the development of information technology has brought immeasurable benefits to the society, so how to further apply information technology to civil engineering and bring huge benefits to civil engineering has become the focus of today's research.

Keywords: Civil Engineering, Computer, Modularization, Aided Design

1. Introduction

The first problem of realizing modular design in computer aided technology is to solve the relationship between graphics module and numerical calculation method. In the structural computer simulation analysis, the prominent feature of the graphic display module is that it is integrated with the selected numerical calculation method[1]. According to the object-oriented idea, the function of the graphic display should be defined as the attribute of the component or unit class in the data structure. In this way, we can divide the data reasonably and realize the logical correspondence between the data structure and the actual structure, so that the program has maintainability and extensibility.

2. Modular application of CAD

With the advent of the information age, computer technology has penetrated into every field. At the same time, with the increasing scale and investment of civil engineering, computer technology has been applied to the construction of civil engineering. Major engineering design; Heavy computation;
Long design cycle; High labor intensity is a typical performance of civil engineering. And computer technology has solved these problems very well[3].

2.1. CAD technology

CAD technology is computer aided design and drawing. This is the process of establishing, modifying, analyzing, or optimizing a design using a computer system. Through many years of design practice, CAD technology has played an irreplaceable role in engineering design with the advantages of simplicity, rapidity and convenience of storage. Computer aided design and drawing are used in many projects, especially after the establishment of computer network aided design and management, which can not only improve the design quality, shorten the design cycle, but also create good economic and social benefits.

2.2. The computer simulation system

Due to the existence of natural disasters such as typhoon, earthquake, fire and flood, engineering structure performance needs to face such small probability and large load. It is a very difficult and impractical method to do experiments to verify[3]. First, it is impossible to fully simulate the parameter change bar, second, the cost of physical test is too high, and third, it is dangerous to destroy the experiment and the equipment is difficult to keep up. The computer simulation technology can simulate the whole process from deformation to collapse of a civil engineering structure of prototype size under the action of disaster load on the computer, so as to reveal the unsafe links and factors of the structure, thus greatly improving the reliability of civil engineering.

2.3. The different types of civil engineering

Involved in the civil engineering structure, material mechanical properties and stress distribution is complex, its component failure modes including, pressure, bending, shear and torsion, bonding, slip, bureau of pressure, die-cutting, fatigue and buckling, etc., traditional computing methods cannot obtain accurate judgment, and the emergence of this phenomenon has not been seen, but through computer aided 3 d graphics technology is used, the materials, components and structure of all levels of response, including unit space trajectory, crack distribution and three-dimensional deformation of structures, the dynamic response of structure space visual expression.

3. Application of high-performance simulation software in civil engineering

3.1. The significance of simulation technology in civil engineering

Computer simulation is of great practical value to structural engineering. Because of the high cost of structural testing and generally destructive testing, one specimen cannot repeat the same test many times. The project management quality control process is as follows[4].
The size of the model is large, even if the scale model test is done, the requirements on the test equipment are quite high, and the physical, mechanical and other corresponding relations between the scale model test of structural engineering materials and the full scale test are a complex problem. In addition, there are many other problems, such as the large dispersion of test results caused by many uncertain factors and high cost. Simulation technology can solve the following problems:

◆ Compare the selected overall schemes of various structures through simulation, so as to select a reasonable structure system;

◆ Analyze the responses of structural components under various actions, and rationally select structural parameters of structural components;

◆ Determine the reaction law of the structural system, select the appropriate excitation, and optimize the parameters of the structural system;

◆ Conduct simulation experiments on the preliminary design of the structural scheme to check whether the structural reaction meets the requirements.

China's construction enterprise informatization as a whole is still at the primary level of development. Lack of rational planning for information construction; the development and utilization of information resources has just started, so it is difficult to achieve the purpose of optimizing the allocation of internal and external resources of the general contractor\textsuperscript{[51]}\textsuperscript{.} Construction engineering management information system development and relatively closed application status is still in the stage, our country engineering project management information system is in accordance with the planning, design, construction and operation of the project such as stage of development of stage product, information, and project management process in different stages of the project information cannot be achieved between the data exchange and sharing, project participants and in between project participants, and project participants between departments and the government investment projects is also unable to realize information exchange and sharing, and thus formed the "information island" group of internal management and external management group of "information island", data redundancy, cause a large amount of manpower material resources waste.
3.2. The disadvantages of the existing simulation technology

The main contents of computer simulation research are the establishment of structure model and analysis method and the development of simulation system. In the simulation design of civil engineering, based on the complexity of civil engineering design, there are some defects in the simulation. The distribution of project management indicators is as follows\cite{6}.

![Figure2. Project management indicators](image)

For example, the constitutive relationship of concrete material plays a "core" role in structural engineering simulation, but due to its own complexity, a suitable constitutive relationship that can describe the characteristics of solidified soil under all conditions has not been proposed until now. However, the existing constitutive relations all have their applicable scope. Therefore, based on the purpose and requirements of simulation, the constitutive relations that can reflect the intrinsic mechanism of materials should be determined according to certain standards.

For the simulation of simple structures such as reinforced concrete beams, the constitutive relation classes in concrete can be established according to the concept of object orientation, and various structures can be obtained by overloading each constitutive relation according to the requirements of simulation. But for complex structures such as high-rise buildings, such a treatment is obviously impossible to achieve. And now the goal of the simulation has moved from simple beams and columns to the entire architectural system. Therefore, the computer simulation technology in civil engineering cannot be satisfied, still need to be further developed.

3.3. The development direction of simulation technology

With the development of engineering practice and theoretical research, the requirements of high precision, full factor, large scale and true 3d are put forward for computer simulation analysis. It is necessary to make a deep discussion on the efficient graphic modeling of human-computer interaction, the visual inspection of computational models, and the inspection and evaluation of computational results.
At present, China has a good civil engineering information foundation, civil engineering information construction and development has begun to take shape, formed a relatively complete theoretical system and a large number of practical technologies, but these still cannot meet the needs of the development of civil engineering. Especially in the network technology research, most of the information and management system is still based on local area network (LAN), while the mutual communication and data sharing between the machine, but can't make the information exchange between institutions, limits the entry of information and extraction, and also limits the project management and resource sharing, brings to the management of a lot of the same, become the factors hindering the development of the civil engineering informatization. In addition, scholars in various fields of civil engineering have carried out researches on various information technologies, but none has formed a scale, resulting in the duplication of researches and the waste of resources. In the future, it will be necessary to conduct comprehensive research and strategic planning on civil engineering informatization from the perspectives of technology, politics, economy and law.

4. Conclusion

At the beginning of its development, it was mainly used for scientific calculation and computer graphics. With the progress of civil engineering information technology, computer professional software has been widely used in civil engineering, and has brought a new revolution to the traditional civil engineering design. In the future, computer aided technology in civil engineering will mainly focus on computer design software, simulation system, management information technology in civil engineering applications to carry out research, step by step toward the information civil engineering, and finally realize a set of civil engineering information solutions.

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