

Research on Innovative Strategy of Modern Architectural Design Method Based on Parametric Model

Xiaobo Zheng

Xi'an Aeronautical University, Xi'an, Shaanxi, China

ABSTRACT. *The ethos of the digital age has penetrated into our lives, and our performance in the design field has evolved from the earliest computer-aided artificial intelligence to algorithm-based parameter design. We are now in a non-standardized multi-age. Computer-aided design tools, parametric design will become a design method, a bottom-up approach to design. It is mainly the result of optimizing behavior through physical control elements and combination rules, a computer language that controls various operating processes and key indicators, and parameters. It brings new efficiency, new methods and new thinking modes to design. Practice is the sole criterion for testing truth. This article studies the multi-objective optimization through the practice of parametric design in design practice, in order to study the operability of parametric design in landscape architecture design practice. In the process of design practice, we set the main goals through the design practice of the Yundonghai Park Half-Bridge, and through the design practice of building, structure, budget and other related specialties, the design results are evaluated at each stage. This drives the design process.*

KEYWORDS: *Parametric model, Modern architecture, Design method*

1. Introduction

Systematic algorithms in digitization are used in design to create a theoretical framework of logical relationships. The nature of this method rigorously applies the process of reasoning to design methods. The quality of this design approach is the process of implementation. Designers are just like scientists, performing accurate analysis and reasoning on the practice platform; and encouraging comprehensive thinking in multiple disciplines, and the openness of knowledge in each other can allow colleagues to cross the boundaries of disciplines and form more areas of development. Parametric design has become the focus of everyone's attention in the field of architecture and product design. Most well-known domestic and foreign law firms and universities have researched this area, and academic activities are in full

swing. However, domestic landscape design companies basically use computers for drawing work and do not use computers for deduction research. This is inseparable from the reality of the landscape industry. This is related to the late development of the modern landscape discipline, which has caused most people in the society to have insufficient understanding of modern landscape, the content system is not rigorous enough, and popular landscape education is basically not much. Designers tend to prefer subjective form design on parametric platforms, which is the same as previous design methods, and does not really integrate the significance of parametric design into the core of design.

2. Parametric Theoretical Content of Architecture

With the changes in socio-economic conditions, the role of landscape architecture in contemporary urbanization has also quietly changed. The problem facing today's landscape is not only how to create a picturesque fairyland, but also to provide the present Strategies that cause problems during high-speed urbanization. Landscape corner urbanism practitioner James Corner put forward the concept of "rejuvenation" in his book "On the Recovering Landscape of Contemporary Landscape Architecture". He believes that landscape architecture needs to be added to the practice of society in the current social development. To meet the needs of society, it is not only necessary to pay attention to the external form, but also to become a method to solve the problem. Parametric technology is landscape architecture. The revival of learning provided good technical support.

Different from the previous landscape design process, the parametric method can use the comprehensive graphical analysis method to extract the logic implicit in the environment, display it graphically, and conduct research at different levels. During the solution process, due to the different weights of the parameters, the presented structure is unpredictable, and "multiple solution" answers can be obtained. The results from multiple angles can be continuously optimized. Designers turn to scientific reasoning and judgment, and grasp the direction more clearly and rationally. Programs and algorithms have become the main design tools, and logic and subjective judgment complement each other, and have become an open design method. The use of digital and parametric technologies will undoubtedly advance the in-depth development of the discipline of landscape architecture. Of course, although parametric design can generate many possibilities, it cannot make the final choice. The result of parameter generation is a supplement to people's subjective experience-creation behavior, and must not make the thinking of landscape architecture busy. Therefore, in the trend of parametric technology, it is necessary to combine the objective diversity of parameters with subjective thinking and judgment.

3. Scientific Theoretical Basis for Parameterized Thought

If Deleuze provides a theoretical basis for parametric design at the philosophical level, so that the architect can escape from the original solid and static architectural

design method and devote himself to the architectural design that seeks freedom, the complexity is scientific Appearance provides a scientific theoretical basis for parametric design on another level, which guides architects to engage in parametric design research more directly, accurately and intuitively. The so-called complexity science refers to taking the complex system as the research object, transcending reductionism as the methodological feature, and the main task of revealing and explaining the operating rules of the complex system. The main task is to improve people's ability to understand the world, explore the world and transform the world Objective A new form of interdisciplinary scientific research. 5 Complexity simply refers to the synthesis of many researches on complexity theory. Its core meaning is difference and diversity. It is relative to simplicity and is used to define the organizational level of things or systems. In fact, when we talk about "complexity", we have actually defined a complex system in advance, and it seems that there is no association, but the relationship between the elements in the system or between the elements or between the subsystems and the subsystems is established. There is a strong force between them. For example, a group of seemingly chaotic people, but where A is B's brother, B is C's neighbor, C is D's classmate, D is E's friend, etc. The relationship between each two adjacent individuals is ok It is clear that although the entire system can be defined in this way, it still shows great complexity. Taking the example just mentioned, A may be Chinese, D may be a foreigner, and so on. So, to put it simply, complexity is the comprehensive nature of complex systems. The basic characteristics of complex systems are non-linearity, uncertainty, self-organization, and emergence. Therefore, chaos, self-organization, and emergence of complex systems will occur.

The impact of complexity science on architectural theory is relatively slow, but there are still some pioneers in the construction industry who have realized the importance of this revolutionary science, and tried to actively connect the discipline of architecture with the science of complexity, and strive to learn the basics of their foreign fields. Theory (fractal theory, self-organization theory, emergence theory, etc.) and applied to architectural design. In addition, the continuous development of digital technology has laid a strong foundation for in-depth research on complexity science, and has also become a link between architectural design and complexity science. Among the many complex scientific theories, the main theories that directly affect parametric building design are: fractal theory, chaos theory, self-organization theory, and emergence theory.

4. Architectural Design Methods under Parameterized Platforms

If the development of philosophical ideas and complexity scientific theories by Deleuze et al. Provides sufficient theoretical basis for parametric building design, then the development of digital technology is providing architects with parametric non-linearities that could have been expected but could not be obtained. The transformation of the architectural form may provide a reliable realistic basis. Parametric architecture itself is a complex system from the perspective of complexity science. It should be the product of multi-dimensional and diversified requirements,

rather than relying solely on the architect to integrate various geometric bodies under the guidance of self-consciousness. It is not superimposed with the function at will, nor is it based on some of the architect's pursuit of gestalt, pure and simple aesthetics, and exists outside the overall environment. The complex system of architecture should be the product of the constraints of the environment in which it is located. It emerged through the building system itself after properly and properly handling the interaction of the constraints in these environments. For traditional building design, the analysis of these environmental factors is done by the architect. In the parametric building design stage, the architect must use computer digital technology to analyze the environment in which the building is located, and analyze various environmental factors. Perform simulation and response, and build the building from the bottom up according to the architect's grasp of the overall factors.

The logic of traditional disciplines requires that the designer's thinking model develops in a one-way, linear direction. What to do first and what to do has formed a stage1-stage2-stage3-stage4-- ... stage N--outcome Fixed straight-line thinking mode, and it is difficult to achieve leapfrogging and striding thinking such as step1--stage1--reason a--methodα-- This horizontal thinking mode and divergent thinking mode can make the design give more abstract meaning, and the steps, processes, causes, methods and results that make up the design have become an organic whole, and this is the linearity. There is no advantage to thinking. Although there is no substantial contradiction between linear thinking and horizontal divergent thinking in the parametric design process, often in the actual design process, linear thinking can not be achieved in a relatively limited time because of too much focus on one of the main lines of many factors And effort to allocate other aspects of operation. Linear logic thinking exists in most architectural designs, including some parametric designs. The root of its existence is that the rules applied to these design methods are unique and deterministic. Because in the process of this design method, there will always be corresponding deterministic answers to the established steps and rules. This has formed a highly efficient but inflexible operational information chain, which is similar to the stage1--stage2--stage3--stage4-- ... stage N--outcome fixed mode similar to that mentioned above. In the discussion of the concept of parametric design, the focus should be on whether to continue to develop along the linear thinking mode, or to explore a different path, to use divergent thinking to innovate, or to combine linear thinking with divergent thinking. Optimize parametric design thinking. This emphasis is not only on the transformation of uniqueness and certainty in the design method, but on whether to replace them with open thinking. In this way, we can infer from the fixed mode above similar stage a-stage a1-stage b-stage c-...-stage c1-stage b2-stage d2-stage a3-... --Stage nn. Therefore, the transition from a unique and deterministic process to an open and divergent process provides a space for more people to comment and judge, that is, in many intermediate processes, such as stage a1 , Stage b3, stage c2 ... all meet the requirements of the architect, but the design results they generate may not meet the requirements of the architect. It can be seen that the choice of architects can bring more subjective judgment criteria. Different architects will choose different intermediate processes, that is, different variables, and generate different results with different humanistic values and values. Human-computer interaction design process. In contrast, the linear thinking process mode

cannot achieve this process, because under the unique and deterministic thinking logic, the entire design process has only one definite design result, and there is no multiple and divergent intermediate processes. So when the architect faces an inevitable result, there are only two choices, either accept or give up. It can be seen that the essence of parametric building design generation logic lies in its multivariate initial stage, multi-directional intermediate process, and diversified generation results, as well as the overall operability and choice of the architect in the entire process. Sexual and decisive.

The generation mode of parametric building design has completely departed from the traditional modeling platform and is completely based on the collage and operation through geometry, but an algorithm-based generation. The so-called algorithm is a “step to solve a problem. An algorithm can be defined as any special method for solving a certain type of problem. In computer science, an algorithm is described by a computer algorithm language, and an algorithm represents the accuracy of solving a problem by a computer. Effective methods: Algorithm + data structure = program, solve a given computable or solvable problem, different people can write different programs to solve the same problem, there are two problems here: one is with The calculation method is closely related to the algorithm problem; the second is the technical problem of program design. There is a close relationship between the algorithm and the program. “4 Therefore, it can be seen that the process of generating a model by the algorithm is no longer focused on a few or specific geometries. Operations, but the laws that generate them. To build a model using a traditional geometry-based operation platform, we need to determine a series of information such as the size and location of the geometry before we can start building the model, and then we will consider how to manipulate these geometries. In contrast, for the model generated based on parameterization, the geometry information is not a priority issue, but the algorithm is used to control the input of the parameters after the corresponding model is given.

5. Conclusion

As far as parametric design is concerned, this new design method injects fresh blood into traditional architectural design and provides architects with new design ideas and methods. Compared with the traditional design thinking, the architect's self-subjective ideas and the pursuit of gestalt continue to deepen and strengthen the mode of working to achieve this goal in the work. Parametric design is through the rules set in advance. Through the combination and arrangement of rules and the iterative calculation between rules, a kind of bottom-up logical generation is formed. Although the digital technology represented by the computer differs greatly from traditional design in terms of ideas and methods, after exploration and research, the author has also begun to agree with the methods and methods of digital technology as a new force, perhaps just as a supplement to traditional architectural design Or it is a kind of development and topology. It blends with traditional design methods and methods, but it also develops. From some aspects of its combination with green architecture,

the relationship between parameterization and green architecture is not antithesis or subversion. Instead, they are organically combined and mutually reinforcing.

References

- [1] Wang Yangwenjie(2016). Application of BIM technology in deep design of mechanical and electrical engineering of an office building. China High-tech Enterprises, 2016, no.12, pp.12-19.
- [2] Lu Dan, Li Chengming, Wang Dasui, et al. (2010). Integrated modeling and optimization design of free-form surface Research. Journal of Building Structures, no. 05, pp.59-64.
- [3] Yu Tiefeng, Ge Yanping(2016). Research on Parametric Feature Modeling of Architectural Design Based on Hybrid Model. Computer-Aided Engineering, no.3, pp. 19-29.
- [4] Wu Yue(2010). Innovation of Contemporary Architectural Design. Knowledge Economy, no. 13, p. 119.
- [5] Liu Shang(2017). Study on Creation Method of Parametric Regional Architecture . Engineering Construction and Design, no 20, pp.16-21.