

Creative Design of Cloud Shoulder in Qing Dynasty Based on Fractal Art Theory

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Abstract: Through the in-depth study of fractal art theory and cloud shoulder in Qing Dynasty, this paper discusses the innovation and value of applying fractal art theory to cloud shoulder pattern design in Qing Dynasty. It aims to make traditional culture more attractive by means of design techniques and expressions that are popular with contemporary people. The article first analyzes the research status and value of the combination of fractal art and modern folk. Then it explains the basic principle of fractal art and reviews the history of Yunbei in Qing Dynasty. On this basis, the innovation of this research direction in pattern, structure and material technology is elaborated, and some practical cases are analyzed to demonstrate the innovation of applying fractal art theory to the creative design of cloud shoulder in Qing Dynasty. This paper not only enriches the theoretical framework of cloud shoulder design, but also provides a valuable reference for the modern transformation of traditional dress culture.

Keywords: Fractal Art Theory; Cloud Shoulder of Qing Dynasty; Innovation; Pattern Design; Self-similarity

1. Introduction

1.1 Research Status at Home and Abroad

1.1.1 Domestic research status

First of all, from the perspective of history and culture, the research on the historical development and cultural connotation of the cloud shoulder in the Qing Dynasty has been extremely extensive. Many studies have shown that the development of cloud shoulder can be traced back to the pre-Qin period and reached its peak in the Qing Dynasty through the changes of The Times. Therefore, this paper finally chooses cloud shoulder in the Qing Dynasty as the main research object. In the development of the past dynasties, the cloud shoulder has gradually

developed from the practical oriented to the practical and beautiful direction, it not only has decorative functions, but also carries rich cultural connotation and symbolic significance.

Secondly, from the point of view of patterns, the patterns of cloud shoulders in the Qing Dynasty are extremely extensive and diverse. In addition to common animal and plant types, they also include some auspicious patterns. The selection and creation of these patterns mostly come from the daily life of the Chinese people. Through some abstract processing, they are endowed with new connotations, so that different patterns have their unique meanings. From the existing data, Chinese scholars have in-depth research on the meaning of cloud patterns, color composition and so on.

Thirdly, from the perspective of creative design, in recent years, with the continuous development of digitalization, fractal art theory has gradually emerged, and domestic scholars have begun to try to combine this modern design form with traditional cultural elements, such as the combination of fractal theory and poster design, and the combination of fractal theory and national patterns. However, the research and analysis of cloud shoulder in Qing Dynasty are relatively few. Fractal art, with its unique self-similarity, infinite complexity and fine structure, provides a new source of inspiration and design means for cloud shoulder design, which is also the innovation point of this paper[1].

1.1.2 Foreign research status

From the perspective of foreign research, foreign scholars have not only conducted in-depth research on fractal theory, but also analyzed the pattern and color matching of cloud shoulder, etc. However, the case of integrating fractal theory into the design of cloud shoulder in Qing Dynasty is relatively rare, and foreign research on this theory focuses more on the analysis of data or technology. However, with the continuous development of globalization, This research direction combining cross-domain

design with Eastern and Western culture will get more attention and attempts. Some international brands have also begun to integrate cloud elements into their designs, creating fashion items with more Oriental visual effects, making their designs reflect the integration of multi-cultures[2].

To sum up, the creative design of cloud shoulder in Qing Dynasty based on fractal art theory has a certain research foundation and practical exploration at home and abroad. In the future, with the exchange and integration of global culture, the creative design of Qing Dynasty cloud shoulder based on fractal art theory is expected to be more widely developed and applied.

1.2 Research Value

The characteristics of fractal theory promote the innovation of cloud shoulder design, break the traditional shape of cloud shoulder decoration, and open up a new perspective. In the design process, designers can use fractal algorithms to generate complex and changeable patterns, and with the help of technology to achieve design patterns and visualization effects that cannot be formed by traditional design thinking, so as to improve the dynamic and powerful visual impact of cloud shoulder. In this era of rapid development, cultural heritage has become the most powerful pillar of design works, emphasizing the clever combination of tradition and modernity, and some traditional elements in a single form are gradually forgotten[3]. By integrating fractal art into the design of cloud shoulder in the Qing Dynasty, the revitalization and inheritance of traditional culture can be effectively promoted.

2. Overview of Fractal Art Theory

2.1 Basic Concepts of Fractal Art

Fractal art originates from fractal theory, which is an art form based on geometric principles. Therefore, fractal art has both rational algorithms of mathematical principles and perceptual visual effects of art. The concept of fractal was first put forward by Mandelbrot, who developed the concept into fractal theory on the basis of his previous research on fractal fragmentation and applied it to the field of mathematics. This complex mathematical concept can be used to explain some phenomena or things in nature that cannot be analyzed by

geometric principles. Taking mountains as an example, different mountain forms are different, and its trend cannot be described and summarized by regular geometric shapes, while fractal theory can analyze the complex structure of mountains with fine mathematical algorithms and structures. Fractal art theory has only been introduced into design in recent years. Professor Liu Huajie of Peking University has published a book called *Fractal Art*, in which he proposed the definition of fractal graphics. Professor Liu believes that fractal graphics are based on nonlinear scientific principles and generate certain graphics and animations through computer numerical calculation, which have both aesthetic interest and scientific connotation. Eventually it will be shown or played to the audience in some way. Through the self-similarity and fine structure of fractal art, designers make design works more colorful and open a new window for the design field[4].

2.2 Features of Fractal Graphics

2.2.1 Self-similarity

Self-similarity is the most prominent feature of fractal art, the so-called self-similarity refers to the shape, structure or arrangement form, a certain part of the figure has a certain similarity with the overall pattern to some extent. Taking Islamic geometric figures as an example (Figure 1), a new complete figure is formed through repeated superposition and dislocation of circular, hexagonal and other patterns, and the resulting pattern has self-similarity with the original elements. Applying this feature to the design can enhance the sense of layers of the work and show complex effects in a simple way.



Figure 1. Islamic Geometric Figures

2.2.2 Infinite complexity

Infinite complexity is reflected in a simple figure through the fractal self-similarity, forming a relatively complex structure, it can be infinite superposition, to achieve an ideal degree of complexity. In this superposition process, the details of the elements will not be affected by changes in the size of the pattern and its fine structure, and this infinite complexity makes the score pattern visually present a delicate and rich effect. Taking the Serpinsky triangle as an example (Figure 2), it is a typical mathematical figure with fractal characteristics. Using the

triangle as the original shape, a triangle is repeatedly excavated by hollowed-out method to form a complex pattern with hollowed-out sense, reflecting this characteristic of fractal graphics.



Figure 2. The Serpinsky Triangle

2.2.3 Symmetry

Symmetry is a common feature of fractal graphics, some of which are simple up and down symmetry or left and right symmetry, and some graphics with rich structures will also have the phenomenon of global and local symmetry. Repeated nesting of an equal ratio graph can obtain a complex graph with global local symmetry[5].

3. History and Development of Yunbei in Qing Dynasty

3.1 Origin and Evolution of Cloud Shoulders

The cloud shoulder originally originated in the Qin and Han Dynasties and was called "shawl", the main purpose of which was to prevent the collar from becoming dirty. With the continuous evolution of the dynasty, the main function of the cloud shoulder changed from practical to decorative, and the types also increased, not only the structure is diverse, but also the decoration is more rich. According to historical records, the Jin Dynasty officially appeared the name of the cloud shoulder, the development of the Qing Dynasty, the cloud shoulder reached its peak, at this time the research data on the cloud shoulder is relatively mature, the producer in the shape and design of the design also have a stronger sense of innovation. The cloud shoulder of Qing Dynasty was influenced by the mainstream patterns at that time, and the cloud shoulder of this period was no longer limited to some myths and legends, but integrated animal and plant patterns, showing the history and culture and uniqueness of this dynasty.

3.2 Types of Cloud Shoulders in Qing Dynasty

3.2.1 Four-in-one cloud shoulder

The four-in-one ruyi cloud shoulder is a very representative cloud shoulder in the Qing Dynasty. It cleverly combines moire pattern with Ruyi pattern, it reflects the Chinese traditional culture's respect for the "round sky and place", the four "rui shape" strip cloud head echoes

back and forth, forming a four-in-one pattern, which means the good wish of Ruyi smooth, and people's yearning for a better life. This kind of cloud shoulder is usually made of colorful brocade with fine embroidery and complex patterns, embroidered with auspicious patterns such as peony, lotus, butterfly and bat. It is colorful and magnificent, showing the exquisite craft and unique charm of Qing Dynasty costume culture.

3.2.2 Willow leaf cloud shoulder

The willow leaf cloud shoulder has a light and smooth wicker character, giving a soft feeling. Its design is inspired by the natural willow leaves, which are cut and embroidered to present the shape of the leaves on the cloud shoulders. The cloud shoulder is also embroidered with various auspicious decorative patterns, but pays attention to the overall simplicity and layering, making the cloud shoulder more visually harmonious and unified.

3.2.3 Lotus cloud shoulder

Lotus style cloud shoulder with lotus as the main modeling element, since ancient times, lotus has symbolized purity, elegance, integrity and integrity. Lotus style cloud shoulder through embroidery lotus, lotus leaves, lotus seeds and other patterns, the beauty of the lotus and the meaning of the perfect integration, reposing people's pursuit of good character and yearning[6].

3.2.4 Prosperous cloud shoulder

The cloud shoulder with melon and fruit patterns is the main decorative element, which is inspired by the melon and fruit patterns in nature, and has the beautiful meaning of having many children and grandchildren and family prosperity. Pomegranate is a more commonly used fruit element since ancient times, through the embroidery of grapes, pomegranates, pumpkins and other seeds rich in fruit patterns, symbolizing the reproduction of life and family prosperity. The cloud shoulder of the melon side not only has a good meaning, but also the pattern is vivid and lovely, the color is bright and bright, and it is deeply loved by people.

3.3 Characteristics of Cloud Shoulders in Qing Dynasty

3.3.1 Center symmetry

The pattern design of cloud shoulders in Qing Dynasty was often based on a certain central point, and the pattern elements were symmetrically distributed around this central

point. This symmetrical layout not only makes the cloud shoulder achieve a balanced and harmonious effect visually, but also gives the cloud shoulder a stable and solemn temperament. While maintaining the symmetry of the center, the pattern of the cloud shoulder also pays attention to the balanced distribution in all directions. Whether it is the size and density of colors, lines or pattern elements, they are carefully designed and laid out, making the cloud shoulder as a whole present a harmonious and unified aesthetic feeling[7].

3.3.2 Rich layers

The Qing Dynasty cloud shoulder pattern emphasizes rich layers, creating a three-dimensional and profound feeling in the superposition and interpenetration of different levels. This sense of layer also makes the cloud shoulder more fine, and sometimes in order to enhance its sense of layer, the color can also be gradually transformed. For example, the color can be gradually adjusted from the center to the outside to obtain a gradient effect based on its central symmetrical structure, and through this method, the cloud shoulder is more visually smooth and natural, with a dynamic aesthetic.

3.3.3 Radiation and rotation

Radiating and rotating are common types of cloud shoulder structures in Qing Dynasty. The radioactive layout makes the cloud shoulder visually expand outward and have a dynamic aesthetic feeling. Willow leaf cloud shoulder is a very typical radiating structure. In addition to the radioactive layout, the pattern of the cloud shoulder also uses a rotary layout, that is, the pattern elements are rotated around a central point, forming a rotating rolling visual effect, and this layout can also increase the movement and vitality of the cloud shoulder.

4. The Application Strategy of Fractal Art in the Creative Design of Cloud Shoulder in Qing Dynasty

4.1 Innovation of Pattern Design

Applying the characteristics of fractal art theory such as self-similarity and infinite complexity to the design of cloud shoulder can make the pattern of cloud shoulder more rich and fine, not only can enhance the level of the pattern, but also can break the pattern of traditional cloud shoulder pattern to achieve the unity of tradition and modern. For example, the embroidery pattern of the cloud shoulder can be based on the

traditional moire and flower pattern to increase the self-similarity of the pattern, so that the pattern presents a similar structure at different scales, forming a visual effect of diversity and unity. In addition, the infinite complexity of fractal patterns can also add more artistic expression to the decoration of the cloud shoulder, and these innovative patterns can not only enhance the artistic value of the cloud shoulder, but also meet the needs of consumers for novelty and uniqueness.

Parting art often constructs patterns through the iteration and deformation of geometric shapes. In cloud shoulder design, this technique can also be used for reference to create a modern and three-dimensional cloud shoulder structure through the combination and reconstruction of geometric patterns such as circles and triangles. This not only enriches the design language of cloud shoulders, but also makes its structure more stable and changeable, retaining the charm of traditional cloud shoulders. It incorporates elements of modern design.

4.2 Innovation of Structural Design

The application of fractal art theory can also provide new ideas and methods for the structural design of cloud shoulder. The traditional cloud shoulder structure is mostly flat, and the use of fractal art theory can help designers explore more three-dimensional and multidimensional structural design methods. For example, fractal algorithms can be used to create 3D renderings that can be converted into cloud shoulder finished products through processes such as cutting and sewing. This three-dimensional structural design can not only better adapt the cloud shoulder to the body shape, show the curve beauty when wearing, but also enhance the visual impact and artistic expression of the cloud shoulder[8]. For example, fractal elements can be added to the edge design of the cloud shoulder so that the external contours represent similar wavy or jagged structures on different scales to enhance the visual impact of the cloud shoulder.

4.3 Innovation of Materials and Processes

In terms of materials and processes, the infinite complexity of fractal art theory can provide new and innovative ideas for designers, who can combine fabrics made of various materials with other modern technological means such as 3D printing and laser cutting to create more

complex and subtle patterns and structures. Create unique visual effects by using new materials with fractal structural characteristics, such as fabrics printed with fractal patterns or metal decorative pieces with fractal textures. In addition, the self-similar characteristics of fractal art can also be transferred to the process design, such as through the embroidery process of fractal patterns or the hollowing process of fractal structures, so that the cloud shoulder shows a unique artistic charm in the process[9,10].

5. Conclusion and Prospect

5.1 Conclusion

With fractal art as the theoretical basis and its application in the design and research of cloud shoulder in Qing Dynasty, this research direction has its inevitability. It can not only play a role in cultural inheritance and innovation, but also improve artistic aesthetic value and enhance social and cultural influence. These values are not only reflected in the academic research field. It is also reflected in many aspects such as cultural inheritance, artistic creation, technological innovation and social practice. This study first introduces the definition of fractal theory and the characteristics of fractal graphics, and then analyzes the development history of cloud shoulder, the types and characteristics of cloud shoulder in Qing Dynasty. Through these early analysis and research, the combination of the two not only expands the application field of fractal art theory, but also enriches the design of cloud shoulder through the features of fractal graphics, endowing the cultural connotation of traditional elements into modern design forms, and provides valuable reference and reference for the theoretical framework of cloud shoulder and the modern transformation of traditional costume culture.

5.2 Outlook

In the future, with the continuous development and improvement of fractal art theory and the growing demand for the integration of traditional culture and modern design in the design field, the design thinking combining fractal art theory and cloud shoulder of Qing Dynasty will attract more people's attention, including the combination of fractal art theory and other traditional elements will have a

broader application prospect. It can make the cloud shoulder become one of the important media to inherit and promote Chinese culture. Through such research ideas and directions, more artistic works with unique charm and cultural connotation can be created. In addition, some algorithms of fractal theory can also be applied to design, which can create design effects that cannot be achieved by pure perceptual thinking. At the same time, with the continuous progress of science and technology, modern scientific and technological means such as virtual reality (VR) and augmented reality (AR) will also provide more possibilities and innovation space for the application of fractal art in the cloud shoulder. In the future, designers will dig deeper into the potential of fractal patterns, by adjusting their proportions, directions, colors and other elements, to create more diverse, more visually striking cloud shoulders.

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