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## SYMMETRY IN NATURE AND SYMMETRY IN FASHION DESIGN

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**Abstract:** *The basic types of symmetry are four. They are reflection or bilateral; rotation or radial; translation; and helical or spiral. Every other type of symmetry is a combination of some symmetries of one of basic type, or between different basic types of symmetry. The paper presents design of collars of ladies' dresses with use of different types of symmetry, which are inspired by symmetry in nature. The collars are chosen as a special case of fashion design. The symmetrical and asymmetrical balance in fashion composition with the use of every type of symmetry, which can be found in nature, and their combination with other principles of composition are very successful way for designing of attractive ladies' garments with definite purpose and character. That combination is found in the use of suitable geometrical form of lines and appropriate colors, according to their associations and the nature is a source of forms and color, and their harmonious combinations.*

**Key words:** *symmetry, fashion design, collars.*

### 1. INTRODUCTION

The balance is one of the principles of design composition. The balance can be symmetrical or asymmetrical. [1] The symmetrical one is based on the four basic types of symmetry, which are reflection or bilateral [1] [2]; rotation or radial [1] [2]; translation; and helical or spiral; or combination between types. [3]

The different types of symmetry in the forms in nature can be used as ideas in fashion design. It is usually considered that a symmetrical composition in clothing is this one which is based on reflection or bilateral symmetry, because of this type of symmetry in the human body. But every other type of symmetry can be used in fashion design, especially in the shape of particular detail or element. The radial, translation and helical symmetry can be used in the both form of balance in the clothing composition – symmetrical composition of a garment (based of the bilateral composition of the human body) or asymmetrical one (different right and left parts of a garment).

The paper presents design of collars of ladies' dresses with the use of different types of symmetry, which are inspired by symmetry in nature. The collars are chosen as a special case of fashion design.

### 2. SYMMETRY IN NATURE

The beautiful dragonfly, presented in figure 1, is an excellent example for bilateral symmetry. The more flowers are formed by radial symmetry – figure 2. Snowflakes are other model of radial symmetry – figure 3. Figures 4, 5 and 6 show spiral symmetry in

nature – shell, sunflower, aloe vera. Figures 7 and 8 present translation symmetry in an agate and leaves.



Figure 1. Bilateral symmetry in nature [4]



Figure 2. Radial symmetry in nature



Figure 3. Radial symmetry in nature [5]



Figure 4. Spiral symmetry in nature



Figure 5. Spiral symmetry in nature [6]



Figure 6. Spiral symmetry in nature [7]



Figure 7. Translation symmetry in nature



Figure 8. Translation symmetry in nature [8]

Figure 9 presents a plant with an interesting symmetrical balance formed on the combination of perpendicular located symmetries in position of leafs. The symmetries can be considered as bilateral and radial. The perpendicular arrangement of the leafs makes amazing spatial rhythm. It is bilateral symmetry because it can be seen two the same form, which are mirror images, right and left ones. And it is radial symmetry too, because it can be considered as rotation of two leafs around a point.

Figure 10 presents a honeycomb. The honeycomb sells form hexagonal net, one of third equilateral grids – the triangular, quadratic and hexagonal nets. The triangular grid is translation symmetry in 3 directions, the quadratic net combine translation symmetry in 4 direction, and hexagonal ones – translation symmetry in 6 directions. The third equilateral grids can be considered as combination of radial symmetries too. These are excellent bases for pattern design of fabrics.



Figure 9. Interesting combination of symmetries, which can be considered as bilateral and radial [9]



Figure 10. Hexagonal net – translation symmetry in six directions or combination of radial symmetries [10]

### 3. SYMMETRY IN COLLARS

For the study of the application of the types of symmetry in nature in fashion design a classic dress in tailored silhouette with knee length is drawn. The dress is a base for different models of dresses with variety of collars, designed with the use of different types of symmetry. The models are presented in figures 11-16.

The most popular type of symmetry in collars' design is bilateral or reflection one. And in forms of collars this type of symmetry can be combined with another type. For example, figures 11 and 12 present dresses with symmetrical collars with element, arranged in radial symmetry.

In the collar of the dress, shown in figure 11, the radial symmetry is applied in multiplication of the geometrical shape of the lapels, forming a radial rhythm (the rhythm is got after triple repeat in particular order).

Figure 12 presents a dress with form of collar with an application of the radial symmetry in 3D elements - radial situated pleats.

Figures 13 and 14 present application of spiral symmetry (a spiral element) in collars design. The spiral element is similar to the form of the shell, shown in figure 4.

The model, shown in figure 13, presents the use of the spiral symmetry as an element in an asymmetrical collar – an asymmetric balance of different right and left part of the collar on the base of bilateral symmetry. The composition principle of similarity is used in the forming of the sleeves in the length line with the use of the same spiral element which is applied in the collar.

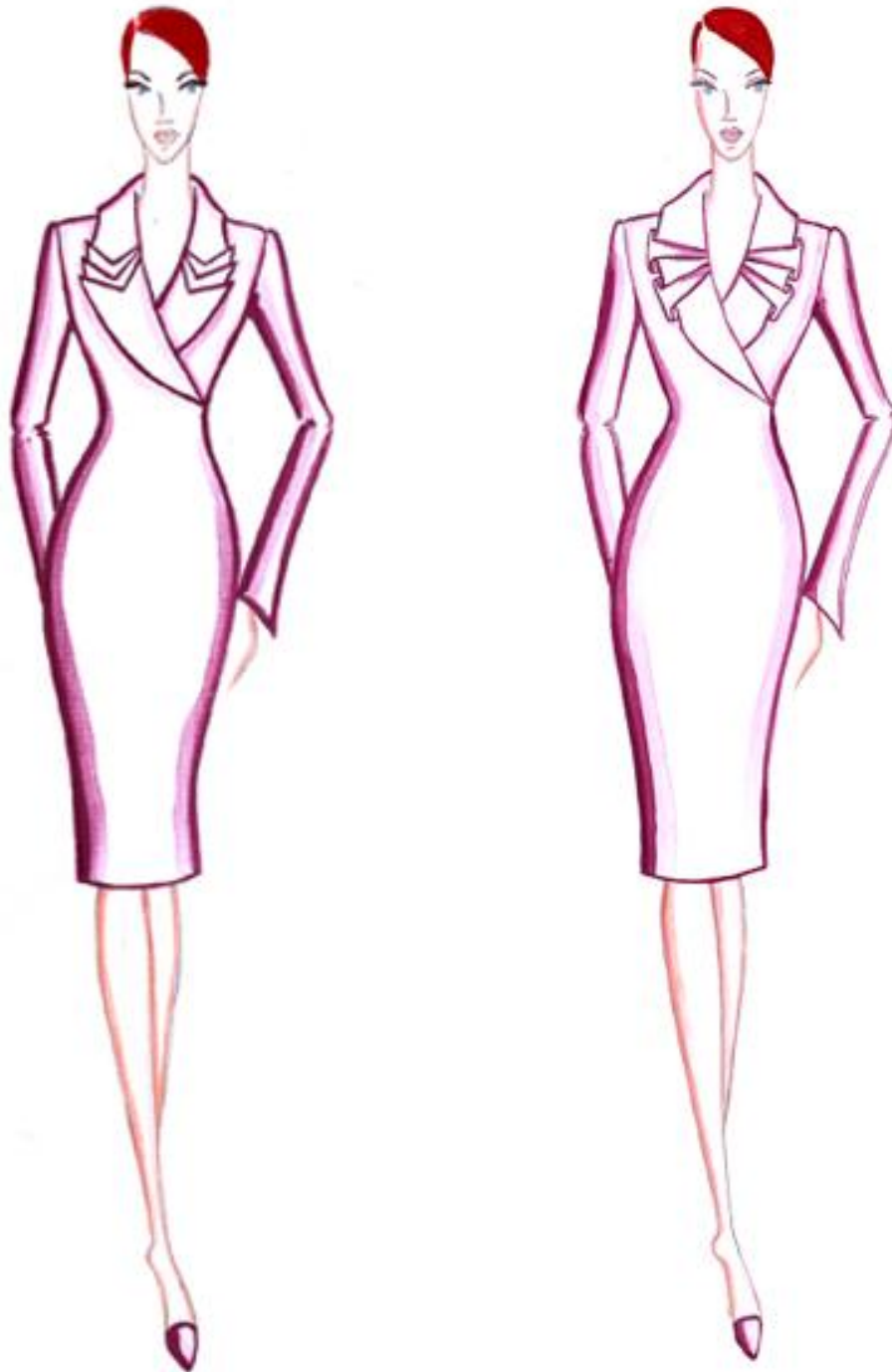
In the introduction it is mentioned that fashion composition can be structured in symmetrical or asymmetrical balance on the base of bilateral symmetry. But it can be added and third balance – symmetrical one with asymmetrical location (according to the reflection symmetry) of small elements or details. This type of balance in composition is presented in the design of the collar in figure 14. The collar is fully symmetrical (on the base of bilateral symmetry) on the first view, but the spiral element in the right and left parts are not reflection symmetrical. They are symmetrical, but according to translation symmetry, because they aren't mirror images, they are oriented on the one and the same direction. Therefore the collar of the dress, which is shown in figure 14, combined three types of symmetry – bilateral, spiral and translation symmetry.

The spiral symmetry in nature always is in proportions of Golden section or Fibonacci order. This regularity can be applied directly in proportions in fashion design.

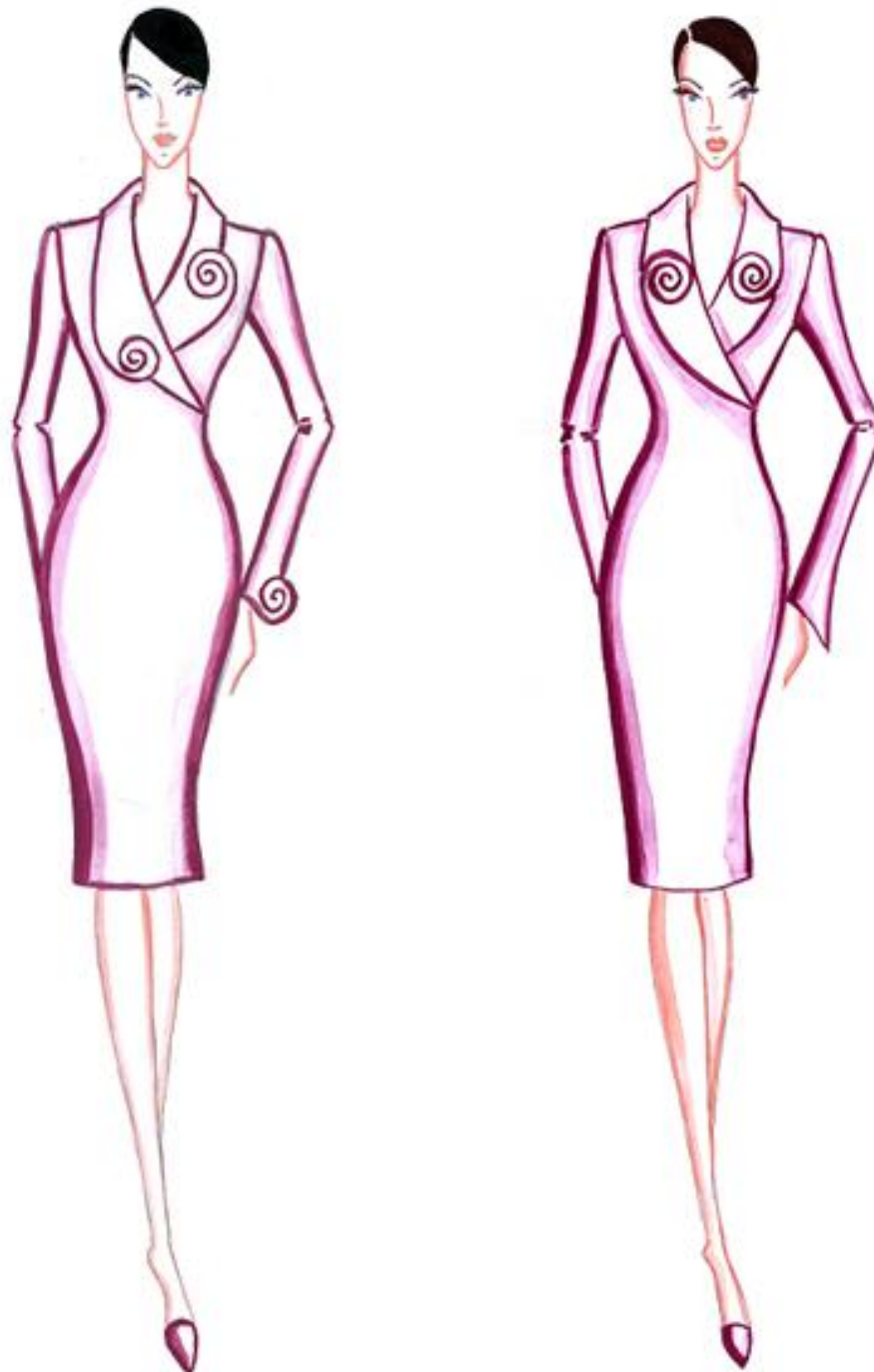
And in the final translation symmetry is seen. It is shown in the model in figure 14, but the spiral symmetry is the basic for the model design. The translation symmetry is basic in the design of the collars of dresses, shown in figures 15 and 16.

The design of the collar of the dress, presented in figure 15, is similar to the one, which is shown in figure 11. But in this case translation symmetry (similar to order of the lefts, presented in figure 8) is applied in multiplication of the geometrical shape of the lapels, forming a linear rhythm in vertical direction.

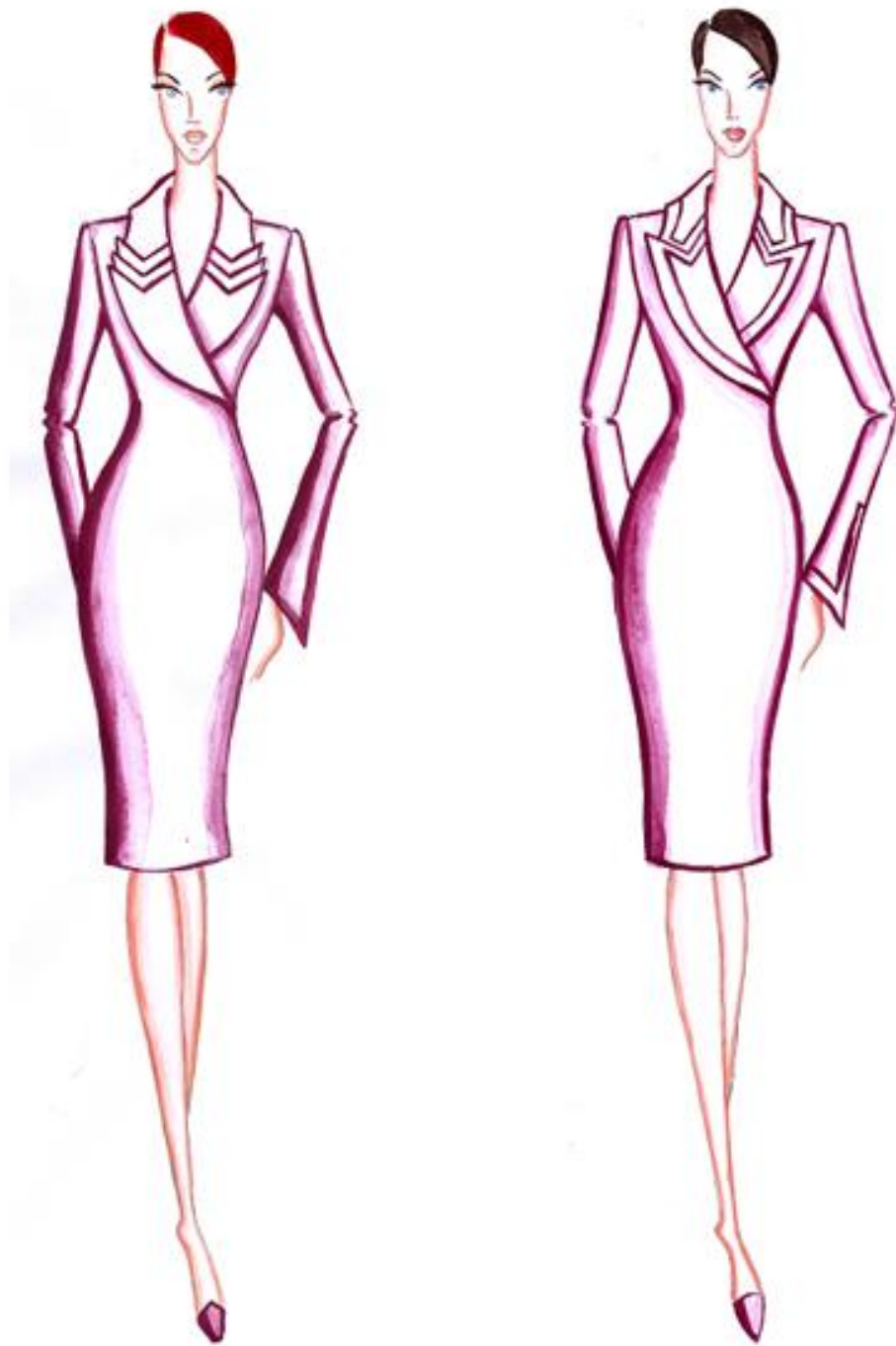
Figure 16 presents the application of translation symmetry in decorative lines in the lapels and collar. The decorative lines are parallel to the collar and lapels edges. The translation symmetry in this model is similar to the equidistant translation symmetry in the agate, shown in figure 7. Like the model, presented in figure 11, the composition principle of similarity is used in the forming of the sleeves in the length line with the use of decorative equidistant lines. Another similarity can be found in presented design and it is connected with the source of the idea – the agate in figure 7. This similarity is the color of the dress – magenta, which is the basic color of the agate.



Figures 11 and 12. Radial symmetry in collar design



Figures 13 and 14. Spiral symmetry in collar design



Figures 15 and 16. Translation symmetry in collar design

#### 4. CONCLUSIONS

The application of the radial symmetry in fashion design brings motion or romantic side in the models, and it breaks up the uniformity and strictness of classic styles of garments. The spiral symmetry brings interesting and artistic note. And translation symmetry introduces elegance and finesse.

The symmetrical and asymmetrical balance in fashion composition with the use of every type of symmetry, which can be found in nature, and their combination with other principles of composition are very successful way for designing of attractive ladies' garments with definite purpose and character. That combination is found in the use of suitable geometrical form of lines and appropriate colors, according to their associations and the nature is a source of forms and color, and their harmonious combinations.

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