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Design Support System for Japanese Kimono

Tetsuya Sano
 Faculty of Education
 Okayama University
 Tsushima Okayama 700-8530, Japan
 gsd97701@cds.cse.wl.okayama-u.ac.jp

Hidekazu Nagahata
 Faculty of Education
 Okayama University
 Tsushima Okayama 700-8530, Japan
 nagahata@cc.okayama-u.ac.jp

Hideki Yamamoto
 Faculty of Education
 Okayama University
 Tsushima Okayama 700-8530, Japan
 yamamoto@cc.okayama-u.ac.jp

Abstract – Japanese kimono has the same shape and the basic size, regardless of the wearer's form. This simplicity of form makes its textile pattern most important to represent the wearer's personality and beauty. As, it is difficult for beginners to imagine the look of the wearing kimono, it makes designs hard. So, we developed a design support system for Japanese kimono.

the look of wearing the yukata are shown at the upper of the screen. The textile pattern is shown at the lower. The size of the yukata is calculated automatically in accordance with the wearer's size. The textile pattern is digitised into 72×200 pixels.

I. INTRODUCTION

Kimono is Japanese traditional clothes. In difference from the western clothes, kimono has the same shape and the basic size, regardless of the wearer's form. This simplicity of form makes its textile pattern most important to represent the wearer's personality and beauty. The yukata is an unlined cotton kimono. Recently the yukata is worn by young people at the celebration of festivals during the summer months. The design of yukata give an impression of coolness and informality. Blue design based on white or white design based on blue is often seen, but colourful patterns are sometimes preferred. Though the yukata is comparatively cheap, the yukata which is designed to the wearer well-matched sets off the wearer's personality. The yukata of wearer's own design has increased for that reason. But, it is very difficult for beginners to imagine the condition of the wearing the yukata, and it makes designing hard. So, we developed a design support system for yukata with confirming the look of wearing the yukata on the screen.

A striped yukata is often arranged to set the stripe in order. The deviation of the stripe is detected by image analysis. The textile pattern of parts is corrected to set the stripe in order. We tried to design the parts of the striped yukata automatically.

II. CAD SYSTEM

Fig.1 shows a basic pattern of kimono. It consists of a right portion, a left portion, a right sleeve, a left sleeve, two front panels below collar end and a collar. The size of parts is calculated from the stature, the sleeve plus shoulder width and the hip of the wearer. A kimono cloth is 36cm width and 1200cm length. Its textile pattern repeats the pattern which is the size of 36×100 cm.

Fig.2 shows the cut plan of the right portion. The design of the right portion is arranged by the cutting position of the kimono cloth. The length from the end of the kimono cloth to the back hem of the right portion expresses the cutting position. The cutting position is shown as d . The rest of parts are also arranged in the same way.

Fig.3 shows the CAD system. The size of the yukata and

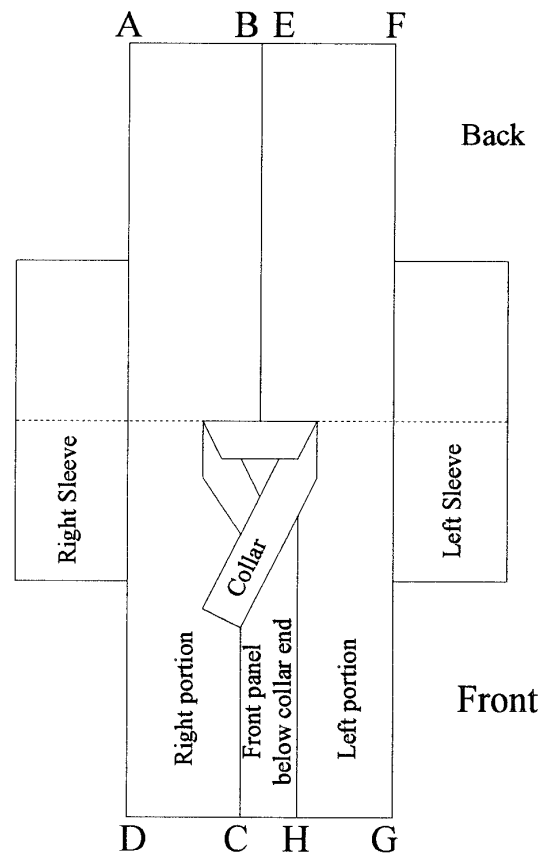


Fig.1 Basic kimono pattern

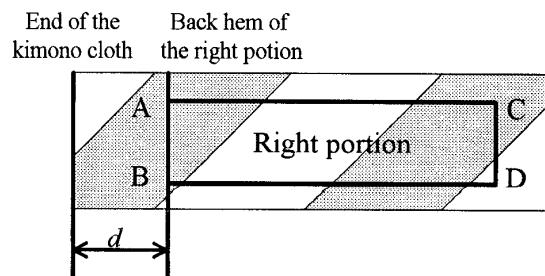


Fig.2 Cut plan of the right portion

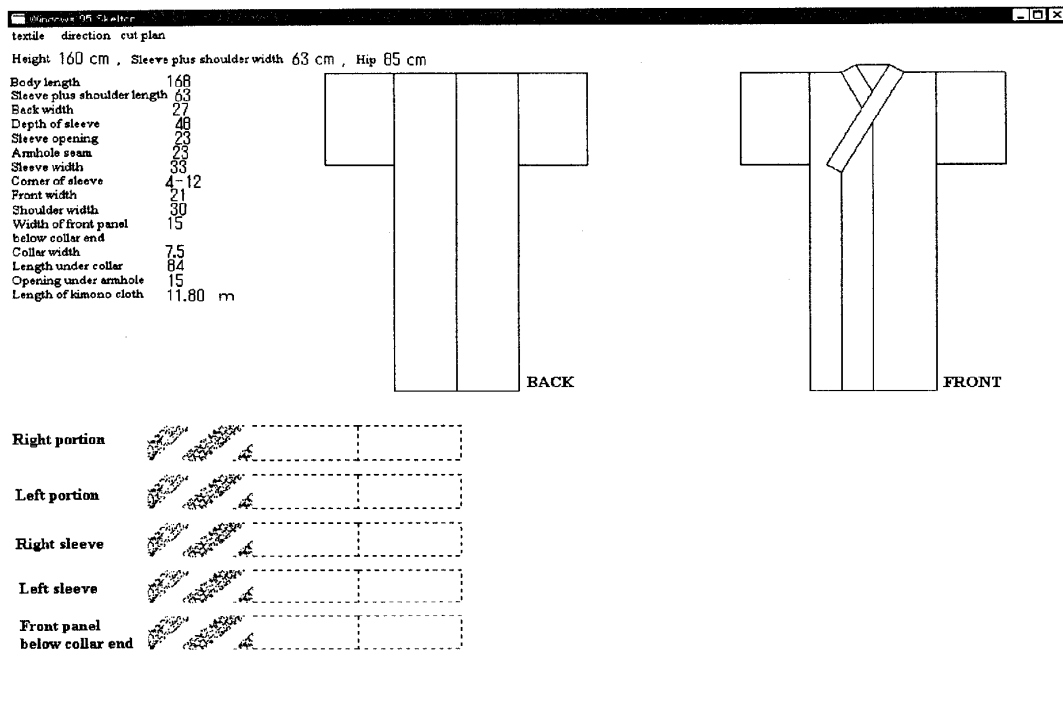


Fig.3. CAD system

The cutting position is inputted through the textile pattern which is shown at the screen. Its range is from 0cm to 100cm. As the textile pattern of the kimono cloth repeats the pattern, the cut plans are automatically determined according to the size of parts.

III. DESIGNING THE STRIPED KIMONO

The yukata of the stripe pattern is often arranged to set the stripe in order. Blue stripe design based on white is often seen. And, the stripe pattern which combined blue with red is sometimes preferred, too. The design that a stripe is set in order is preferred because of its tidy impression. But it is difficult to design it. So, we tried to design the parts of yukata automatically. The designs of parts except the right portion are arranged to set the stripe to the right portion.

Fig.4 shows the cut plan of the right portion and the left portion. The hems of both portions are set to the end of the kimono cloth. As the length of the right portion is 336cm, the left portion is cut at the 400cm from the end of the kimono cloth. Textile patterns are designed as shown in Fig.5. The stripe is not adjusted at the joint. The deviation of the stripe is detected and the design of the left portion can be corrected to set the stripe in order.

The deviation of the stripe is obtained as d . A stripe pattern is drawn with the bold straight line.

Fig.6 shows the design of the left and right portion when the stripe of the left portion is set to the right portion. The hem of the left portion is cut in the position of d from the end of the kimono cloth. The cut plan is determined as

shown in Fig.7.

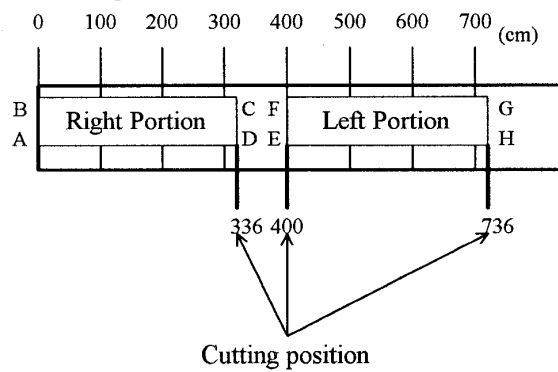


Fig.4. The cut plan of the right portion and the left portion without adjusting the stripe

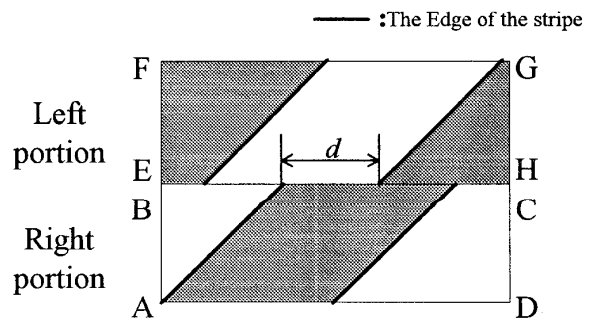


Fig.5. The designing process of the right portion and the left portion

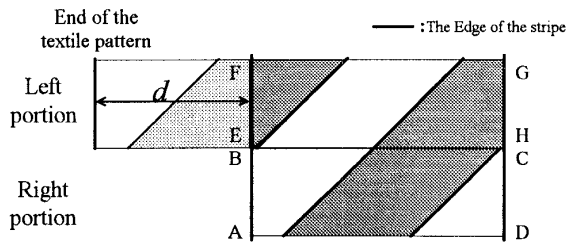


Fig. 6. Adjusted textile pattern of the right portion and the left portion

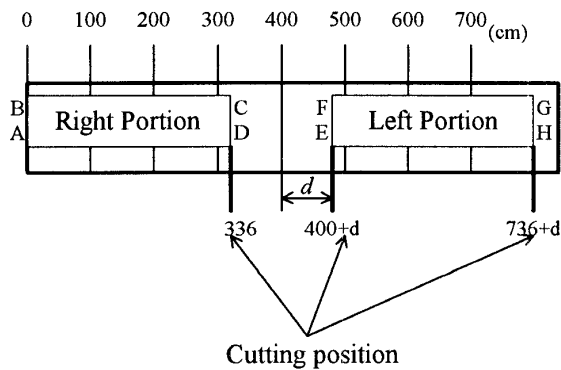


Fig. 7. The cut plan of the right portion and the left portion with adjusting the stripe

Sleeves and front panels below collar end are also designed in the same way.

IV. DETECTING THE EDGE OF THE STRIPE

The textile pattern is converted to the monochrome image. The blue stripe is detected as the dark line, and the edge of the stripe is obtained. But the white pattern is arranged in the whole of the kimono cloth. It makes the edge of the stripe vague, and it is difficult to detect the edge.

The variance of grey levels in a region of 9×9 pixels is obtained. That is large of the blue stripe, and small of the red stripe. The variance of the edge is intermediate of those. The profile of the variance in the length direction is obtained. The profile from L to L' is shown in Fig. 8. The points which are equal to the average are detected as a point on the edge. Fig. 9 shows the points on the edge. The points on edge form the diagonal line.

The pixels which are close each other are searched toward the outside from the centre of the kimono cloth, and classified for the groups of points. The straight lines which are the closest to the points is determined as the edge of the stripe. The edge is determined as shown in Fig. 10.

V. EXPERIMENTAL RESULTS

As a striped yukata without considering to adjust the stripe, the kimono cloth is cut from the end so that the kimono cloth may not be left. Fig. 11 shows the look of wearing the yukata. In this design, the stripe is not sufficiently adjusted, and gives distortion impression. The cut plan of kimono is determined as shown in Fig. 12.

Fig. 13 shows the design of the striped yukata which is set the stripe in order. It is completed for the design of the right portion, and the rest of the parts are arranged its design to set the stripe to the right portion.

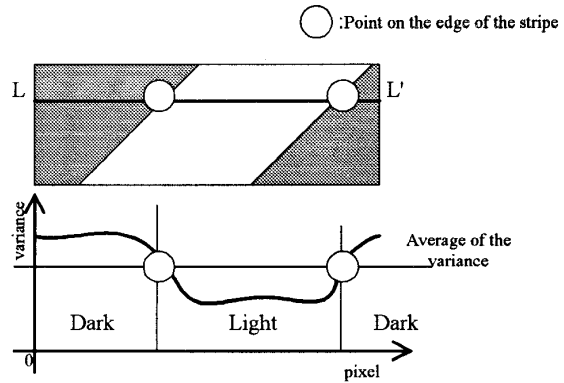


Fig. 8. The profile of the variance in the length direction of the kimono cloth.

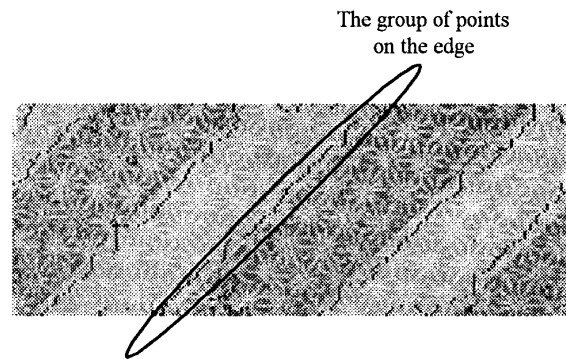


Fig. 9. Detected points

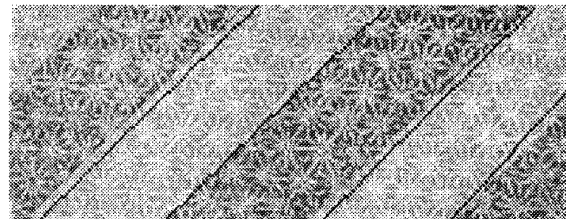


Fig. 10. Detected edge

In this design, the striped textile is sufficiently adjusted, and gives tidy impression. The cut plan is determined as shown in Fig. 14.

Fig. 15 shows the yukata of wave design. The yukata is sewn even if the kimono cloth is to be inside out, because the kimono cloth for yukata has no lining. As the stripe pattern of the right sleeve and the left body is turned over, the kimono is designed as wave pattern. Unique impression is given in comparison with the yukata of stripe pattern. The cut plan is as shown in Fig. 16.

The kimono cloth which arranged the pattern of a butterfly or flower and so on is often used to design the yukata. When designing the kimono of these patterns, it must take care of a balance of the arrangement of the pattern that a pattern doesn't lean. And, the design that a pattern leaned to the hips gives it the impression that it got fat. But, design is difficult because the prediction of the position of the pattern is difficult until a yukata is put on.

Fig. 17 shows the condition of wearing the kimono. It is

the good design of a balance without inclination of the pattern. A cut plan is shown in Fig. 18.

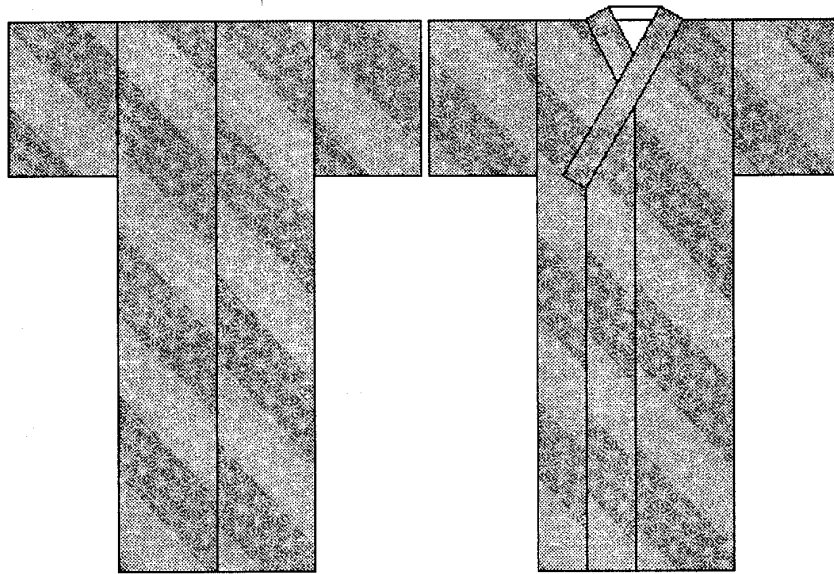


Fig. 11. The look of the yukata without adjusting the stripe

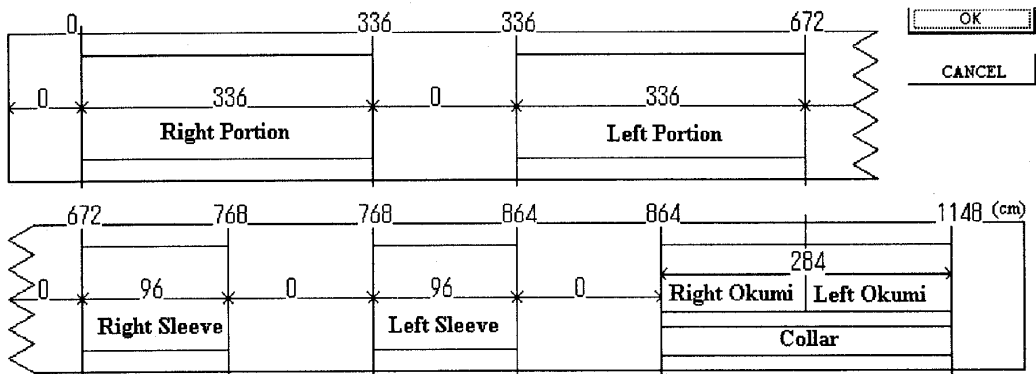


Fig. 12. Cut plan of yukata without adjusting the stripe

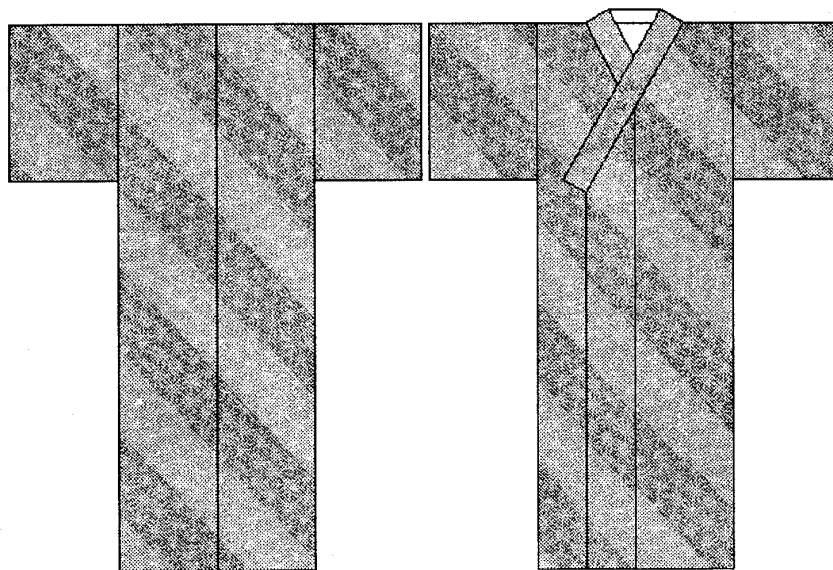


Fig. 13. The look of the yukata with adjusting the stripe

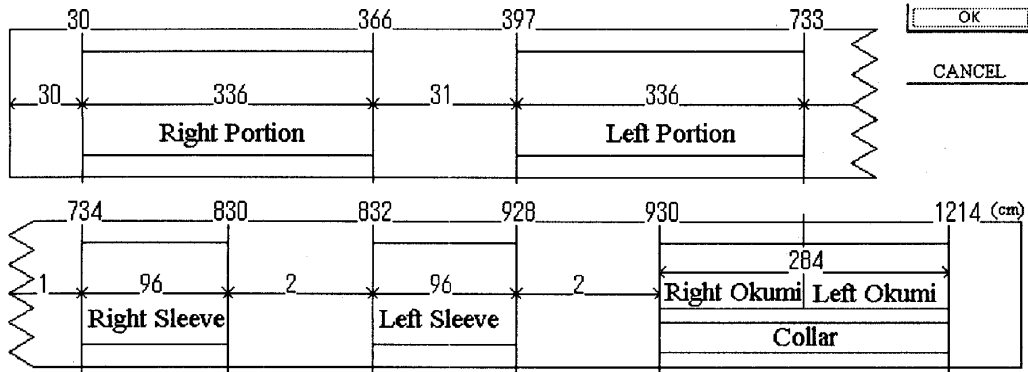


Fig. 14. Cut plan of yukata with adjusting the stripe

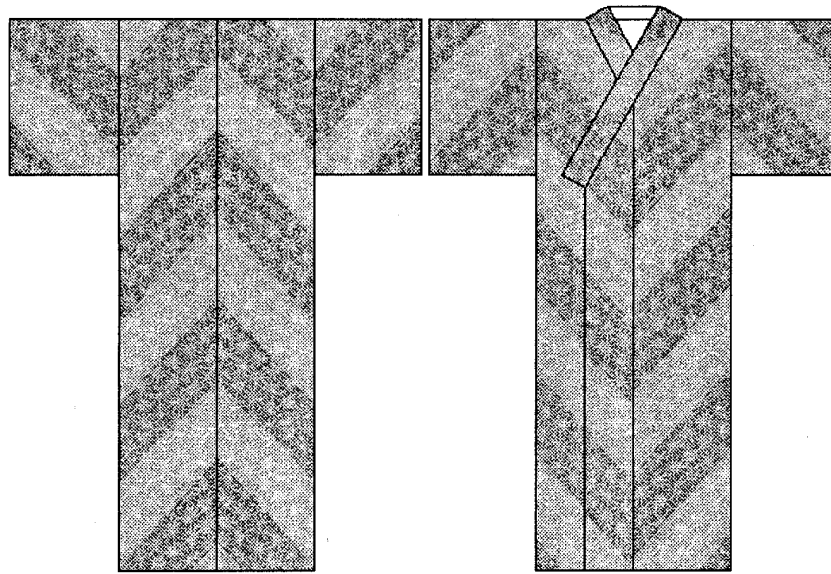


Fig. 15. The look of the yukata with adjusting to wave

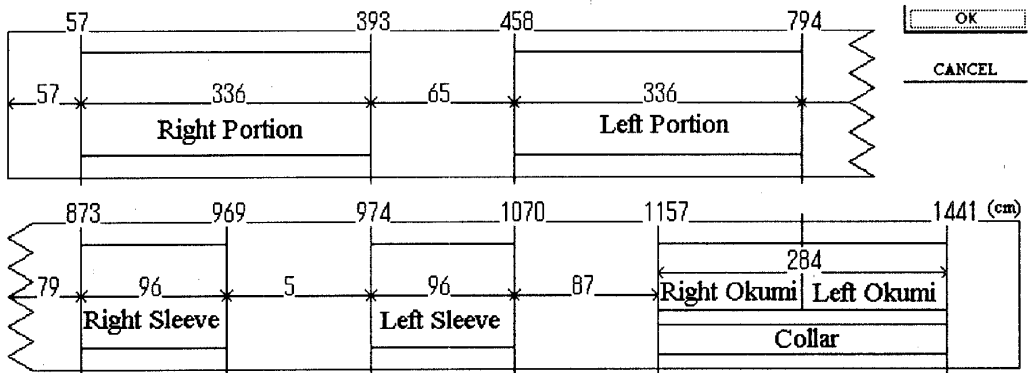


Fig. 16. Cut plan of yukata with adjusting to wave

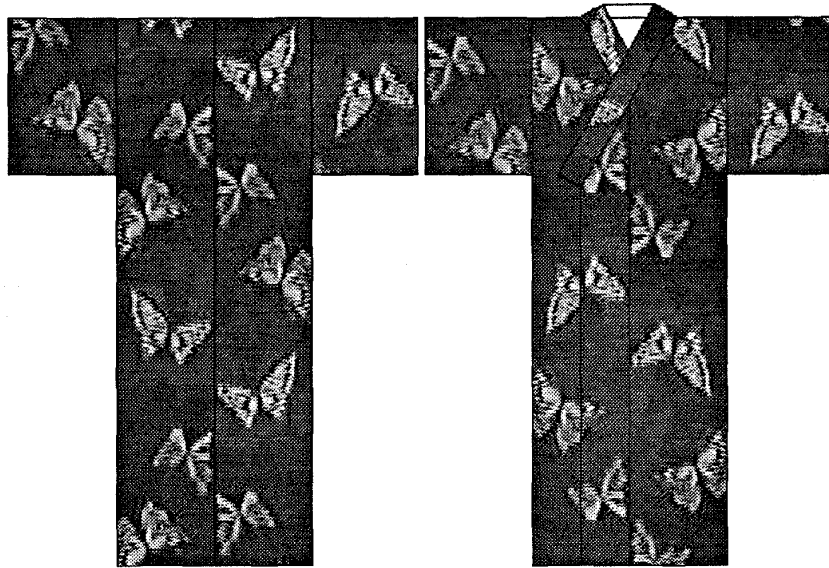


Fig.17. The look of the yukata having the butterfly pattern

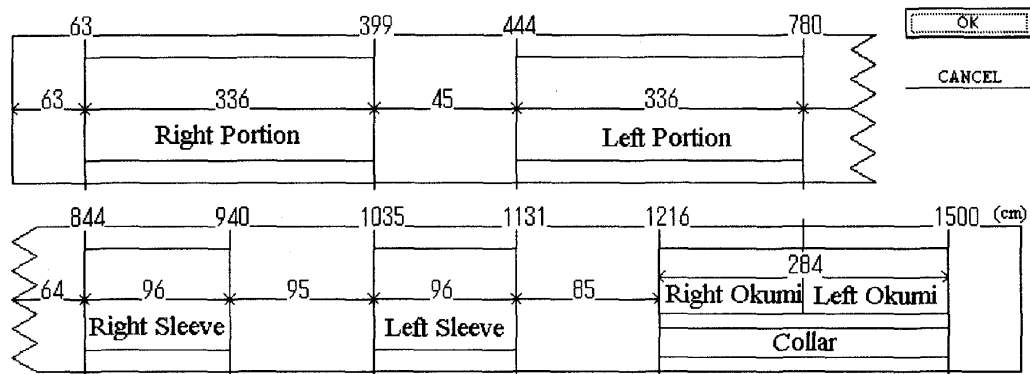


Fig.18. Cut plan of yukata having the butterfly pattern

VI. CONCLUSION

We developed the CAD system that a yukata was designed on the screen of the computer. The cut plan is determined from the design and the size of yukata automatically. The wide variety of the kimono is designed with various textiles. And the part of striped kimono is designed automatically.

As for the yukata, it is important to design it in accordance with the person who puts it on. It can expect that even a beginner can design a yukata easily by this CAD system.

VI. REFERENCES

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