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Research on the Correlation between Wavy Modeling of Garment and Fabric Properties

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Abstract

On the basis of garment spatial configuration technology, the correlation of fabric properties and garment modeling was studied in this paper.

With abundant experimental data, practical modeling and the judgment of fabric properties and physical shape, we analyzed the change rules that restricting all kinds of parameters of fabric properties and garment modeling, and discussed the relation of wavy modeling and all correlated factors of fabric properties. The result showed the basis of choosing fabric for different style garment, which would help designers choosing fabric for modeling design or structure design.

Key words: garment spatial configuration technology, fabric property, garment modeling, garment pattern

I. Physical structure and properties test of the experiment fabric

According to comprehensive and typical principles, 98 pieces of different fabric swatches are selected as the experiment samples. The inside structure of the fabric is their proper properties, including fiber type, length, yarn twist, linear density, style and weaving construction of the fabric. In fashion design, the outside aesthetic appear of the fabric, expressive force forming the garment configuration, weave structure and handle, that is to say the drapability, rigidness and flexibility, shearing property and elasticity is paid more attention. <Table 1> is fiber constitution and the structure of the samples.

<Table 2> is test results of the basic properties statistic of the experiment sample fabrics.

II. Correlation analysis of fabric properties

<Table 3> shows two primary data in every cell: Pearson Correlation Coefficient and 2-Tailed text result. The "**" at the top right corner of the correlation coefficient means that the correlation is significant at the 0.01 level (2-tailed); "*" means the correlation is significant at the 0.05 level (2-tailed).

Analyzing from the test result of the fabric properties, we know that correlation is strong between thickness and weight, static and dynamic drape coefficient, dynamic moire

<Table 1> Fiber constitution and the structure of the samples

No.	Structure	No.	Structure	No.	Structure	No.	Structure
1	Polyester plain	26	Polyester twill ↗	51	Crepe structure	76	Weft plain coating
2	Polyester plain	27	Cotton twill ↗	52	Thick wool fabric	77	Weft plain structure
3	Polyester plain	28	Cotton twill flannel 3/2	53	Complicated structure	78	Weft-knitted pad structure
4	Polyester cotton plain	29	Cotton satin drill	54	Complicated structure	79	Weft-knitted pad boned flannel
5	Viscose plain	30	Satin	55	Brilliant strip structure	80	Weft-knitted brushed coating
6	Viscose plain	31	Satin	56	Jacquard structure	81	Warp-knitted fleeced fabric
7	Polyester plain	32	Satin	57	Jacquard structure	82	Weft-knitted brushed coating
8	Cotton yarn-dyed plain	33	Satin	58	Open texture structure	83	Weft-knitted one-sided velveteen
9	Polyester yarn-dyed plain	34	Satin	59	Joint structure	84	Weft-knitted plush structure
10	Wool/polyester plain	35	Satin	60	Thick weft plain	85	Weft-knitted one-sided velveteen
11	Wool/polyester yarn-dyed plain	36	Satin	61	Thick weft plain	86	Complicated weft-knitted fabric
12	Plain elastic fabric	37	Satin	62	Gold strip plain	87	Polyester gauze
13	Color-striped plain	38	Satin	63	Filigree bias	88	Burnt-out fabric
14	Cotton thick plain	39	Satin	64	Filigree bias square	89	Bonded lace sheer
15	Polyester wool-like plain	40	Satin	65	Fancy combined structure	90	Calendered cloth
16	Cotton plain flannel	41	Jacquard satin	66	Cotton complicated structure	91	Calendered cloth
17	Cotton twill 2/1 ↖	42	Polyester jacquard stain	67	Wool fancy twill	92	Calendered cloth
18	Polyester cotton twill 2/1 ↖	43	Polyester jacquard stain	68	Looper thread plain	93	Spangle
19	Polyamide twill 2/1 ↖	44	Polyester jacquard stain	69	Flannel strip plain	94	Coating
20	Polyester cotton yarn serge ↖	45	Stain brushed fabric	70	Slubby yarn plain	95	Coating
21	Pure wool twill 2/2↗	46	Linen-like irregular structure	71	Cotton weft plain	96	Lace
22	Wool/polyester serge↗	47	Polyester crepe	72	Cotton single rib knit	97	Braided fabric
23	Polyester twill ↖	48	Cotton seersucker	73	Cotton double rib knit	98	Chenille fabric
24	Polyester twill 2/1↗	49	Cotton double strip plain	74	Single rib knit		
25	Jean 3/1↗	50	Crepe structure	75	Double rib knit		

amount, aesthetic feeling coefficient, stiffness coefficient, rigidness and flexibility, warp shearing property and weft shearing property, warp and weft recoverability, warp and weft elasticity.

Therefore, the following analysis selects several typical properties to test and analyze, such as thickness, weight, density, static draping coefficient, rigidness and flexibility, warp shearing property and warp elasticity. The test methods conform to national standards.

A. The organization structure analysis of the fabric: the plain structure has more interlacing points and the most yarn crimps and can flat the fabric cover. The texture is close while firm and crisp, but the handle stiff. Compared with plain structure, twill has longer floating. Twill makes the fabric softer and shiny because the uncrossed warp (weft) yarn is easier to close. On the

<Table 2> Basic property statistic of the experiment sample fabric

Basic property		Minimum	maximum	Average	Standard Deviation
Thickness (mm)		0.100	0.900	0.326	0.19
Weight (g/m^2)		0.27	400	177.39	88.69
Density(piece/10cm)	warp	47	892	320.41	223.61
	weft	45	702	247.31	131.93
Draping Coefficient (%)		33.30	96.71	68.26	22.93
Rigidness and Flexibility	warp	1.69	17	4.12	2.32
	weft	1.65	8.58	3.46	1.53
Shearing Property	warp	0.1	2.1	0.68	0.51
	weft	0.1	2.7	0.94	0.65
Elasticity	warp	0.1	19.5	1.42	2.52
	weft	0.3	22	3.02	3.41
Wrinkle Recovery	warp	19	172	133.02	45.35
	weft	25	162	110.97	44.79

condition that the yarn tex and density is same, the twill is weaker than plain cloth in mightiness and tightness. The bigger circulation the satin has, the longer floating is, and the softer, smoother and brighter the fabric is. The organization structure also affects fineness, softness, intensity, elasticity and so on.

B. Weight test of fabric: There is a connection between weight and thickness. The correlation coefficient is 0.85. Generally, weight adds along with thickness increases. Fabric weight, which also has a relation with fiber, yarn, fabric structure and so on, and directly influences the exterior style, ventilate property etc. Weight can measure wooly feeling of fabric.

C. Thickness of fabric: Fabric's thickness is affected by the structure of fiber and yarn, the organization structure of fabric, finishing, the outside decoration and bonding materials or coating on the fabric etc. Thick fabric usually has bigger thick compressive amount, yet fabric of unequal thickness is unequal in thickness distribution. Knit fabric's thickness is relevant to its weight, fluffiness, rigidness and flexibility, and affects stiffness, fullness, softness, thermal property, ventilate property and so on.

D. Density of fabric: Fabric's density and arrangement of warp and weft count have a great influence on appearance, style, physical and mechanical property of fabric. Fabric which has bigger density is firmer, stiffer, and has better dimensional stability and thermal property but worse air permeability. For it has better intensity, elasticity and abrasion resistance, this kind of fabric can strengthen dropping, fuzz, pilling and snagging resistance etc.

Density of knit fabric concerns length of yarn that forms a loop. The longer the loop length is, the thinner the knit fabric's density is; while the shorter the loop length is, the closer the density is. So loop length is an important coefficient deciding density of knit fabric and is relevant to the nature and degree of thickness of yarn, too.

E. Drapability of fabric: The softer the fabric is, the bigger draping coefficient is, and the better the drapability is. On the contrary, the stiffer the

<Table 3> Correlation analysis of the fabric property test result

Correlation

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	A	1	.850*	.120	.104	.148	.155	.067	-.148	-.168	-.137	.034	.005	.100	-.206	.228*	.277*
	B	.	.000	.256	.328	.161	.141	.531	.163	.107	.190	.750	.962	.384	.152	.046	.046
	C	96	96	91	91	91	91	91	90	93	93	89	89	78	50	77	52
(2)	A	.850*	1	.146	.108	.245*	.231*	.075	-.139	-.263*	-.109	-.018	-.094	.127	-.222	.268*	.281*
	B	.000	.	.168	.307	.019	.028	.477	.191	.011	.296	.865	.382	.266	.121	.018	.043
	C	96	96	91	91	91	91	91	90	93	93	89	89	78	50	77	52
(3)	A	.120	.146	1	.961*	.750*	.727*	.963*	-.997*	-.635*	-.776*	-.067	.064	.278*	.238	.223	.107
	B	.256	.168	.	.000	.000	.000	.000	.000	.000	.000	.543	.559	.015	.108	.054	.465
	C	91	91	91	91	91	91	91	90	89	89	85	85	76	47	75	49
(4)	A	.104	.108	.961*	1	.708*	.702*	.928*	-.961*	-.573*	-.731*	-.058	.119	.261*	.215	.223	.104
	B	.328	.307	.000	.	.000	.000	.000	.000	.000	.000	.596	.276	.023	.146	.055	.475
	C	91	91	91	91	91	91	91	90	89	89	85	85	76	47	75	49
(5)	A	.148	.245*	.750*	.708*	1	.961*	.734*	-.730*	-.666*	-.565*	-.130	-.095	.019	-.054	.388*	.320*
	B	.161	.019	.000	.000	.	.000	.000	.000	.000	.000	.236	.389	.870	.716	.001	.025
	C	91	91	91	91	91	91	91	90	89	89	85	85	76	47	75	49
(6)	A	.155	.231*	.727*	.702*	.961*	1	.722*	-.714*	-.638*	-.547*	-.079	-.063	.007	-.056	.406*	.349*
	B	.141	.028	.000	.000	.000	.	.000	.000	.000	.000	.474	.565	.949	.707	.000	.014
	C	91	91	91	91	91	91	91	90	89	89	85	85	76	47	75	49
(7)	A	.067	.075	.963*	.928*	.734*	.722*	1	-.966*	-.597*	-.676*	-.046	-.094	.276*	.234	.233*	.077
	B	.531	.477	.000	.000	.000	.000	.	.000	.000	.000	.679	.394	.016	.113	.044	.598
	C	91	91	91	91	91	91	91	90	89	89	85	85	76	47	75	49
(8)	A	.148	-.139	-.997*	-.961*	-.730*	-.714*	-.966*	1	.625*	.772*	.068	-.076	-.272*	-.229	-.223	-.121
	B	.163	.191	.000	.000	.000	.000	.000	.	.000	.000	.536	.488	.017	.122	.054	.408
	C	90	90	90	90	90	90	90	90	89	89	85	85	76	47	75	49
(9)	A	-.168	-.263*	-.635*	-.573*	-.666*	-.638*	-.597*	.625*	1	.291*	.090	.027	-.154	.068	-.266*	-.334*
	B	.107	.011	.000	.000	.000	.000	.000	.000	.	.005	.403	.803	.177	.639	.020	.016
	C	93	93	89	89	89	89	89	89	93	93	89	89	78	50	77	52
(10)	A	-.137	-.109	-.776*	-.731*	-.565*	-.547*	-.676*	.772*	.291*	1	.035	-.047	-.173	-.258	-.214	-.238
	B	.190	.296	.000	.000	.000	.000	.000	.000	.005	.	.748	.664	.131	.070	.062	.089
	C	93	93	89	89	89	89	89	89	93	93	89	89	78	50	77	52
(11)	A	.034	-.018	-.067	-.058	-.130	-.079	-.046	.068	.090	.035	1	.401*	.077	.120	-.042	-.017
	B	.750	.865	.543	.596	.236	.474	.679	.536	.403	.748	.	.000	.507	.418	.718	.907
	C	89	89	85	85	85	85	85	85	89	89	89	89	76	48	75	50
(12)	A	.005	-.094	.064	.119	-.095	-.063	.094	-.076	.027	-.047	.401*	1	.007	.083	.000	-.056
	B	.962	.382	.559	.276	.389	.565	.394	.488	.803	.664	.000	.	.950	.577	.998	.698
	C	89	89	85	85	85	85	85	85	89	89	89	89	76	48	75	50
(13)	A	.100	.127*	.278*	.261*	.019	.007	.276*	-.272*	-.154	-.173	.077	.007	1	.669*	-.148	-.308*
	B	.384	.266	.015	.023	.870	.949	.016	.017	.177	.131	.507	.950	.	.000	.198	.028
	C	78	78	76	76	76	76	76	76	78	78	76	76	78	49	77	51

<Table 3> continue

Correlation

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(14)	A	-.206	-.222	.238	.215	-.054	-.056	.234	-.229	.068	-.258	.120	.083	.669*	1	-.206	-.212
	B	.152	.121	.108	.146	.716	.707	.113	.122	.639	.070	.418	.577	.000	.	.156	.139
	C	50	50	47	47	47	47	47	47	50	50	48	48	49	50	49	50
(15)	A	.228*	.268*	.223	.223	.388*	.406*	.233*	-.223	-.266*	-.214	-.042	.000	-.148	-.206	1	.774*
	B	.046	.018	.054	.055	.001	.000	.044	.054	.020	.062	.718	.998	.198	.156	.	.000
	C	77	77	75	75	75	75	75	75	77	77	75	75	77	49	77	51
(16)	A	.277*	.281*	.107	.104	.320*	.349*	.077	-.121	-.334*	-.238	-.017	-.056	-.308*	-.212	.774*	1
	B	.046	.043	.465	.475	.025	.014	.598	.408	.016	.089	.907	.698	.028	.139	.000	.
	C	52	52	49	49	49	49	49	49	52	52	50	50	51	50	51	52

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

(1) is thickness; (2) is weight; (3) is static drape coefficient; (4) is dynamic drape coefficient; (5) is static weave; (6) is dynamic weave; (7) is aesthetic feeling coefficient; (8) is stiff coefficient; (9) is warp rigidness and flexibility; (10) is weft rigidness and flexibility; (11) is warp recovery; (12) is weft recovery; (13) is warp shearing property; (14) is weft shearing property; (15) is warp elasticity; (16) is weft elasticity.

A means Pearson Correlation Coefficient; B means Sig.(2-tailed); C means N.

fabric is, the smaller draping coefficient is, and the worse the drapability is. Fabric which has better bending rigidity has worse drapability. If draping coefficient becomes bigger when area weight increases, it means the drapability is good. The drapability becomes worse if draping coefficient becomes smaller when thickness increases. If the fabric has good crease resistance, its drapability is comparatively worse. Silk fabric normally has good drapability, as well as viscose rayon and noil cloth, but terylene is usually rigid and has worse drapability. Drapability of linen fabric woven from hard twist yarn is greatly improved.

F. Rigidness and flexibility of fabric: Knit fabric has better softness. Compared with knit fabrics, woven fabrics with same thickness have better bending rigidity. Under the circumstances that other conditions are same, plain cloth is rigidder. When yarn floating length increases and interlacing points between warp and weft yarn decrease, bending rigidity will reduce and be in proportion to weft (or length grain) in the condition of the same length grain (or weft) tightness, and fabric made by such yarns will be soft. The increasing of length warp tightness and weft tightness arise change the rigidness and flexibility of fabric, and the result is similar; in the condition of similar tightness, for fabric of thin yarn, the bending rigidity value is smaller, while fabric which bending rigidity is better has stiffer handle.

G. Shearing property of fabric: Fabric which has tight organization structure usually shows worse shearing property, but it's not absolute. Many superfine fiber fabrics that have tight structure have medium shearing property; moreover, some fabrics that have loose structure also have better stability because of special finishing. Shearing property directly affects blocking technics during the garment making process and appearance when worn. Fabrics with bigger shearing property and loose structure will have more transfiguration when affected by tension, such as flax, silk and viscose fabric.

H. Elasticity of fabric: When the figure form needn't be totally according to, the elasticity character of fabric makes it possible for making fitted garment. As long as the fabric has corresponding elasticity, even though the shape of garment piece is very simple, it can be also consistent with figure. Knit fabric has bigger elasticity, but its recovery is worse.

I. Wrinkle recovery of fabric: Crease resistance of garment material is related to elasticity, initial modulus, geometry form size, stretching deformation recovery, twist and fineness of yarn, the organization structure of fabric, density and finishing etc. Wrinkle recovery has close relation with the fiber type, and usually natural fiber has poorer wrinkle recovery than synthetic fiber. Textiles which made of stretchy wool and polyester fiber are not easy to get wrinkles. And the wrinkles in which also have better recovery. Wool fabrics have better wrinkle recovery than Knit fabrics.

III. Correlative factors influencing wavy modeling

1. Three-dimensional form effect of flared skirt

In order to get regular conclusion, the style of flared skirt adopts plentiful fabric, including No. 1, 5, 11, 17, 18, 20, 22, 23, 27, 30, 32, 33, 36, 38, 39, 40, 41, 41, 45, 46, 50, 51, 53, 54, 55, 56, 57, 60, 61, 62, 63, 64, 69, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 85, 86, 87, 88, 92, 93, 94, 95, 96 of the fabric storage. There are 52 kinds of fabrics in all, and <Table 4> shows their physical properties and sequence number of modeling.

Make the cut piece of swatch tailored. In order to eliminate the influence on the aspect form of garment caused by the difference of processing condition, flow and quality, the fabrication of all sample garments adopt same making procedure and completed by the same technician on the same machine. After the tail operation, give them finish-ironing and make them worn on model form. Photo all ready made flared skirts. The numbers below the pictures correspond to the number of fabric.

Tidy up and order the pictures from the worst to the best according to the effect of aspect and weave. Carried out by not only one person, the order isn't in terms of amount of weave and size of bottom. If weave sags naturally, equally and symmetrically from the whole modeling effect should be observed. The order result is shown in <Figure 1> in which the number below the picture is number of order-number of fabrics (52 pictures in all).

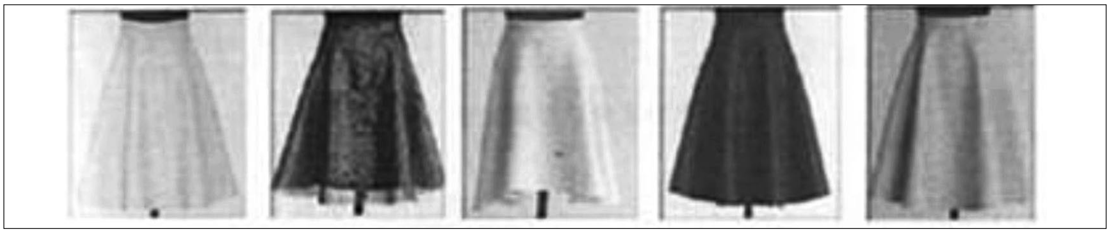
2. Factors of wavy modeling relate to fabric properties

According to fabric property and wavy modeling, correlative factors can be analyzed.

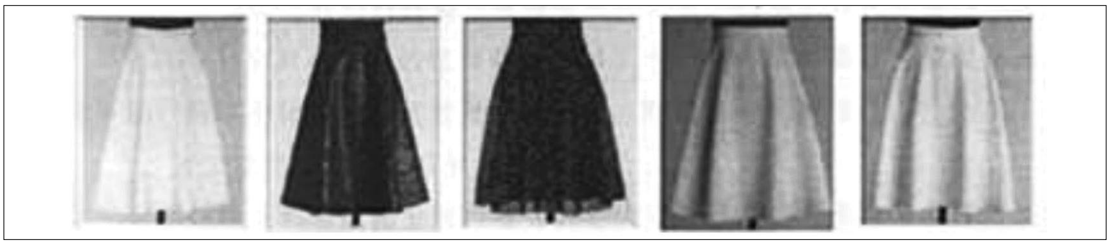
1) Connection between wavy modeling and drapability of fabric

Analyze the connection between drapability of fabric and three-dimensional form effect adopting the method of combining picture analysis and data analysis. In the property test experiments, photo projection of every fabric swatch using digital fabric dynamic drape style machine.

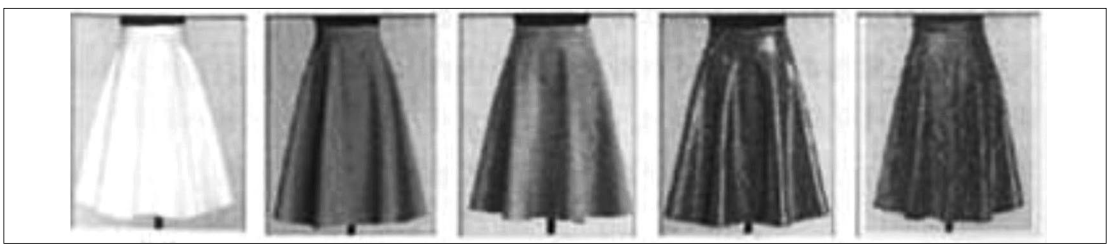
<Figure 1> Order of the flared skirt modeling effect



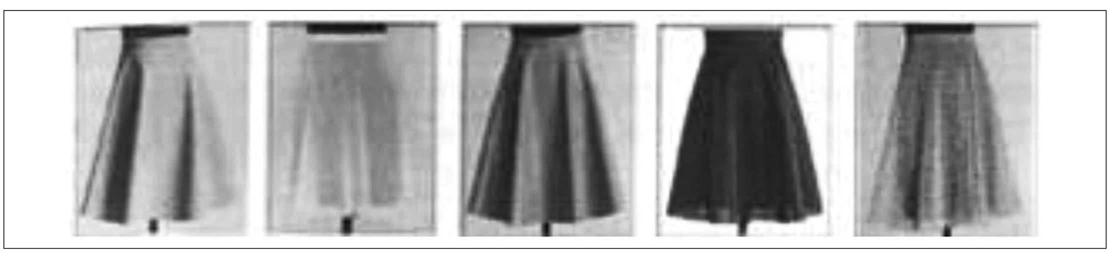
26-51 27-26 28-50 29-22 30-20



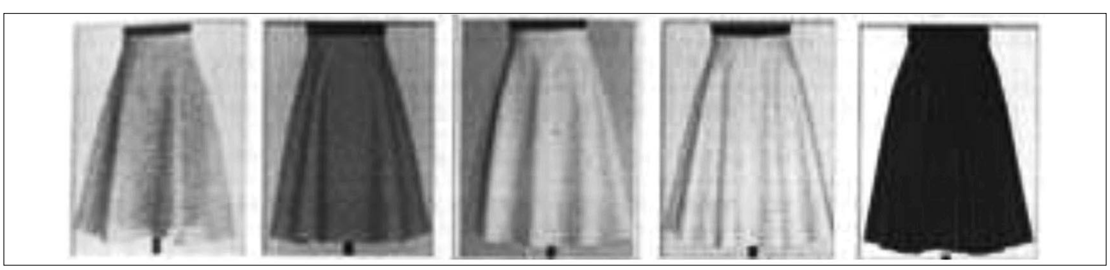
31-73 32-82 33-79 34-23 35-53



36-17 37-46 38-45 39-76 40-80

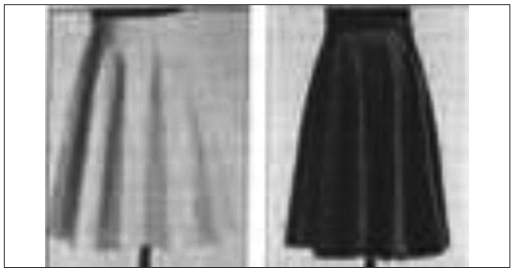


41-94 42-1 43-95 44-86 45-77



46-78 47-10 48-54 49-18 50-85

<Figure 1> continue

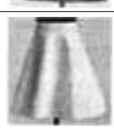
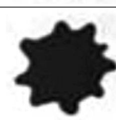
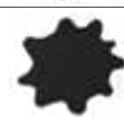


51-75 52-83

<Figure 1> continue

Comparing the photos of projection and modeling we make a intuitionistic judgment. <Figure 2> shows corresponding picture of modeling and projection. Choose several modeling for illustration.

From <Figure 1>, comparing the number of modeling order and drapability in <Table 4>, it can be seen that among the fabrics with bigger modeling number (that means better wavy modeling), fabric which has bigger drapability

No.	Three-dimensional modeling	Static projection	Dynamic projection	Static and dynamic drape coefficient
1				35.62% 59.15%
18				52.58% 52.31%
11				59.99% 59.66%
24				79.36% 77.07%
60				79.88% 78.51%
64				88.29% 86.10%

<Figure 2> Comparison of three-dimensional modeling and drape projection

<Table 4> Fabric property and sequence number of modeling

Fabric No.	Modeling No.	Thickness(mm)	Weight(g/m^2)	Draping Coefficient(%)	Stiff Coefficient(%)	Shearing Property(cm)	
						warp	weft
64	1	0.126	80	35.62	69.83	0.1	0.1
87	2	0.120	27	60.50	43.79	0.5	0.8
40	3	0.210	138	39.38	66.38	0.3	0.2
63	4	0.154	82	33.30	72.41	0.2	-
56	5	0.188	109	59.99	45.69	0.2	2.7
19	6	0.210	118	68.02	37.93	0.5	0.5
88	7	0.138	76	62.15	43.97	0.2	1.0
57	8	0.358	231	54.53	51.72	1.0	-
27	9	0.882	245	79.88	25.00	0.6	0.7
41	10	0.160	95	73.46	31.90	0.7	-
33	11	0.188	132	83.37	20.69	-	-
81	12	0.312	191	67.64	38.79	0.2	-
47	13	0.180	100	-	-	1.0	1.0
69	14	0.351	169	65.51	39.66	0.3	-
36	15	0.172	91	43.33	62.07	0.8	-
92	16	0.108	58	52.58	52.59	-	-
30	17	0.166	93	68.75	37.07	1.4	1.9
55	18	0.266	121	65.94	39.66	0.6	0.9
96	19	0.251	129	81.85	22.41	-	-
5	20	0.234	136	81.09	23.28	1.4	1.6
60	21	0.346	154	71.82	33.62	0.8	-
61	22	0.268	173	55.13	50.00	0.9	-
39	23	0.302	201	49.22	56.03	0.6	-
93	24	0.190	88	80.95	24.12	1.0	-
32	25	0.155	102	80.37	24.12	-	-
51	26	0.474	251	72.23	33.62	1.0	1.0
62	27	0.122	51	71.27	33.62	0.3	-
50	28	0.326	164	83.66	20.69	2.0	2.4
22	29	0.302	223	56.51	50.00	0.3	0.5
20	30	0.338	271	78.55	25.86	0.7	0.5
73	31	0.534	261	-	-	-	1.0
82	32	0.648	326	57.04	49.14	0.2	-
79	33	0.234	99	86.06	15.52	-	-
23	34	0.428	267	77.21	27.59	1.1	1.5
53	35	0.216	132	76.81	27.59	0.8	1.4
17	36	0.176	119	53.13	53.45	0.6	1.0
46	37	0.278	186	79.36	25.00	1.3	-
25	38	0.900	260	43.99	61.21	0.5	0.5

<Table 4> continue

Fabric No.	Modeling No.	Thickness(mm)	Weight(g/m²)	Draping Coefficient(%)	Stiff Coefficient(%)	Shearing Property(cm)	
						warp	weft
76	39	0.412	229	61.17	45.69	0.2	-
80	40	0.346	171	-	-	0.2	0.3
94	41	0.356	204	80.37	24.14	2.2	2.7
1	42	0.122	55	87.43	16.38	0.6	1.1
95	43	0.374	136	78.42	25.86	0.5	-
86	44	0.428	200	71.02	34.48	-	-
77	45	0.344	63	85.84	18.10	0.2	-
78	46	0.254	92	88.04	15.52	-	-
10	47	0.226	162	81.27	22.41	0.2	0.4
54	48	0.424	241	79.96	24.14	2.1	1.4
18	49	0.248	192	77.10	27.59	0.5	0.5
85	50	0.548	353	88.68	14.66	1.4	1.0
75	51	0.368	201	88.44	14.66	-	-
83	52	0.356	143	88.29	14.66	-	-

take a large proportion, so we can conclude that there is certain connection between drapability and wavy modeling but not linear direct proportion.

Analyze the fabrics in <Table 4> whose drapability doesn't accord with direct proportion with wavy modeling and there are several circumstances below:

One: For some fabrics which are transparent or have nice luster even strong reflex effect, systematic errors occurred when testing drapability and cause drap coefficients tested are bigger than the real ones, such as No.87, 93, 96 and so on.

Two: Although some fabrics have good drapability, their number of modeling is smaller (that means not good wavy modeling). They have great differentiation between warp and weft count or warp and weft rigidness and flexibility so the flared skirts are not symmetrical in right and left, such as No.27, 33 and so on.

Three: There are still some fabric with excellent drapability and shearing property which have great differentiation between front, back centre line (warp direction) and side (bias grain direction) in a flared skirt form. The waves at which makes front and back centre are much smaller than that at the right and left side, which makes inequality on the circle of a flared skirt, such as No.50.

2) Connection between wavy modeling and rigidness and flexibility of fabric

From analyzing stiff coefficient of fabric, it can be known that the bigger the stiff coefficient is, the worse drapability fabric has, and the connection is almost linear. Therefore, connection between wavy modeling and rigidness and flexibility is in other words between modeling and drapability.

3) Connection between wavy modeling and fabric weight

From <Figure 1>, compare the number of

modeling order and weight of fabric in <Table 4>. Fabric with bigger drapability has lower weight and relatively better wavy form, such as No.77, 78, 83, 85 and so on. When drapability is in smaller area, the lower the weight is, relatively, the worse the form effect is, such as No.36, 63, 64, 92 and so on.

Fabric weight is helpful for effect of fitted flared skirt. For fabric with not nice modeling, weight will aggravate bad weave effect, such as No.27, 28, 40 and so on. For fabric with pleat on the vertical direction, higher weight can make obvious swing effect.

For fabric having bigger stiff coefficient, the effect of wavy form is relatively better if the weight is bigger, like No.44. So as for fabric having stiff handle, better wavy effect can be got if we add fabric's weight. In garment patternmaking, stiffer fabric will have different wavy modeling due to different skirt length. Long skirts have better effect than short ones.

4) Connection between wavy modeling and thickness of fabric

From <Figure 1>, compare the number of modeling order and thickness of fabric in <Table 4>. Common fabric's thickness redounds to get good effect.

5) Connection between wavy modeling and shearing property of fabric

From <Figure 1>, compare the number of modeling order and shearing property of fabric in <Table 4>. Fabric can accommodate space to a certain degree if it has a certain degree of shearing property, so the garment can receive satisfied effect. However, excessive shearing property will bring hardness when cutting and tailoring, especially when the selvage of the cut piece is bias grain. Front centre and back centre are warp while two side seams are bias grain, and this can result in excessive shearing property, inequality of weave amount and nonlevel of the bottom and suchlike. When fabric has better stiffness, good sheaving property administers to the wavy modeling, and proper match can also improve the modeling effect.

IV. Analysis on the correlation of wavy modeling effect and fabric properties

In order to analyze the relationship between wavy modeling effect and fabric properties more scientifically, we add up the correlation coefficient of them. Coefficient r, whose value is between -1 and 1, is a quantitative index describing the extent of linear correlation between two variables. The closer the value approaches -1 or 1, the closer the connection is, and it explains that the connection isn't close if the value is close to 0. This analysis calculates Pearson Correlation Coefficient directly according the value observed.

Analyzing the correlation coefficient method adopting the Correlate function of SPSS, then mutual correlative numbers and significance level of every variable will be gained, which showed in <Table 5>.

Analyze the correlation of every property data of fabric and sequence number of the modeling in <Table 4>. <Table 5> is correlation coefficient matrix of property test result and sequence number. At cell crossed by every row variable and line variable there is correlation coefficient calculation results of two test index. <Table 5> shows two primary data in every cell: Pearson Correlation Coefficient and 2-Tailed test result. The "**" at the top right corner of the correlation

<Table 5> Analysis data of correlation between wavy modeling and fabric property

Correlation

		No.	Thickness	Weight	Draping Coefficient	Stiff coefficient	Warp Shearing Property	Weft Shearing Property
No.	①	1	.322*	.364*	.570*	-.577*	.319*	.298
	Sig.(2-tailed)	.	.020	.008	.000	.000	.040	.131
	N	52	52	52	49	49	42	27
Thickness	①	.322*	1	.785*	.085	-.081	.219	.172
	Sig.(2-tailed)	.020	.	.000	.559	.580	.163	.391
	N	52	52	52	49	49	42	27
Weight	①	.364*	.785*	1	.083	-.073	.418*	.409*
	Sig.(2-tailed)	.008	.000	.	.570	.620	.006	.034
	N	52	52	52	49	49	42	27
Draping Coefficient	①	.570*	.085	.083	1	-.999*	.339*	.411*
	Sig.(2-tailed)	.000	.559	.570	.	.000	.032	.046
	N	49	49	49	49	49	40	24
Stiff Coefficient	①	-.577*	-.081	-.073	-.999*	1	-.350*	-.418*
	Sig.(2-tailed)	.000	.580	.620	.000	.	.027	.042
	N	49	49	49	49	49	40	24
Warp Shearing Property	①	.319*	-.219	.418*	.339*	-.350*	1	.959*
	Sig.(2-tailed)	.040	.163	.006	.032	.027	.	.000
	N	42	42	42	40.	40	42	26
Weft Shearing Property	①	.298	.172	.409*	.411*	-.418*	.959*	1
	Sig.(2-tailed)	.131	.391	.034	.046	.042	.000	.
	N	27	27	27	24	24	26	27

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

① is Pearson Correlation Coefficient.

coefficient means that the correlation is significant at the 0.01 level (2-tailed); "*" means the correlation is significant at the 0.05 level (2-tailed).

From analysis of the data in <Table 5>, in the properties of fabric that have the most influence on the effect of wavy modeling is drapability and stiffness, secondly is shearing property, weight and thickness of the material.

V. Conclusions

1. Drapability of fabric is a very important factor of the wavy modeling. Bigger draping coefficient make the better wavy modeling, but the relation between them isn't a linear direct proportion.

2. The effect that fabric weight has on the wavy modeling is: the smaller the weight and the bigger the draping coefficient is, the better the

modeling is; for fabrics which have bigger stiff coefficient, the bigger the weight is, the better the modeling is.

3. Fabric thickness is helpful to the effect of the wavy modeling.

4. Good shearing property of fabric is helpful to the modeling, however, excessive shearing property can result in inequality of weave amount and nonlevel of the bottom and suchlike.

5. The order of fabric properties affecting the wavy modeling is: drapability, stiff coefficient, shearing property, weight and thickness.

References

1. Zhang Wenbin, Wang Zhaohui, Zhang Hong. 《Fashion Draping》. China Textile Publishing Company. Beijing. 1999
2. Shi Fengjun. 《Calculation of Fabric Wrinkle Recovery Angle》. Wool Science. 2001 (6) : 11~15
3. Wang Fumei. 《Properties Design of Fashion Fabric》. China Textile University Publishing Company. Shanghai. 2002
4. Liu Jingwei. 《Garment Material Experiment Tutorial》. China Textile Publishing Company. Beijing. 2000
5. Wei Jing. 《Draping Technique》. NanKai University Publishing Company. Tianjin. 1995

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