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Study Of Height Dependency Of Drape Parameters.

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Abstract:-Drape coefficient is a dependent value which itself is not sufficient to describe drape. Along, with this other drape parameters are also required to have a profound understanding of drape. In this paper it has been tried to find out the height dependency of these parameters to explain drape more explicitly. It shows that a positive correlation exists between the height of hanging and drape coefficient, Nodal length whereas a negative correlation exists with drape distance ratio. Poor correlation is seen with other parameters. These outcomes can be used to improve garment designing applications.
Keywords: - Drape, Drape coefficient, Height of Hanging, Node parameters, Drape parameters

I. INTRODUCTION

The role of drape in a garment is an important aspect of aesthetics. Drape can be defined as a property which characterizes the shape of a fabric when it is hanging down of its own weight. Drape is a unique property that allows a fabric to be bent in more than one direction describing a sense of graceful appearance. (11, 13) Drape properties are needed when modeling the cloth in virtual environment. (1, 6, 12) The drape coefficient is the widely used parameter to describe fabric drape but it needs other parameters to explain the fabric drape behavior. (2) Thus it may be better to use these parameters along with coefficient values as the latter is affected by the former. (3, 4). It has been explained earlier that for complete understanding of fabric drape profile node parameters such as number of nodes, nodal length, nodal distance and other drape parameters such as drape distance ratio, fold depth index and amplitude are required. (5, 7-9). The correlation between node parameters and constructional & bending properties has been studied (9). In the present study it has been tried to find out how the node parameter & drape parameter will be affected on changing the height of hanging of the fabric. By considering different heights a perspective of how a particular fabric which has been used to manufacture a garment appears on individuals of different heights can be studied. Here, the basic aim of this study is analyze the dependency of height on drape considering different drape parameters.

II. MATERIALS AND METHOD

Samples used are 100% cotton fabrics with warp and weft counts as $2/20^s$ and $2/40^s$ respectively. The structural parameters like end per inch, picks per inch, thickness & gsm were measured. For finding out the effect of height on these drape parameters different hanging height of the fabric were considered for each sample as per the table. The height can be changed with the help of marking given on the rod which is used to hold the supporting disc. The fabric sample was hang then height of hanging was considered from the point of hanging as in figure 1 Node parameters were calculated by using manual method where a centre was marked on the ammonia sheet and as the shadow is casted and cut, the node parameters such as no of nodes, nodal length and node distance are marked and measured. In earlier papers the measurement of these parameters was done according earlier discussed paper. (8-9) but here it is done manually as per figure 2. Also, other drape parameters like Drape Distance Ratio, Amplitude and Fold Depth Index were measured and calculated as depicted in figure 3.

In the given figure and formulas 'As' is Area of draped fabric sample, 'A1' is Area of the fabric supporting disc, 'A2' is Area of the fabric sample disc,' r_1 'is radius of fabric supporting disc, 'r_2 'is radius of fabric sample disc,' r_{min} 'is the minimum radius of the draped fabric sample,' r_{max} 'is the maximum radius of the draped fabric sample (12)

The formulas used are given as:
Drape coefficient= $[As-A1]/[A2-A1]$
Drape Distance Ratio= $[(r_2-r_{avg}/ (r_2-r_1)]*100$
Fold Depth Index = $[(r_{max}-r_{min}/ (r_2-r_1)]*100$
Amplitude = $(r_{max}-r_{min})/2$ [12]

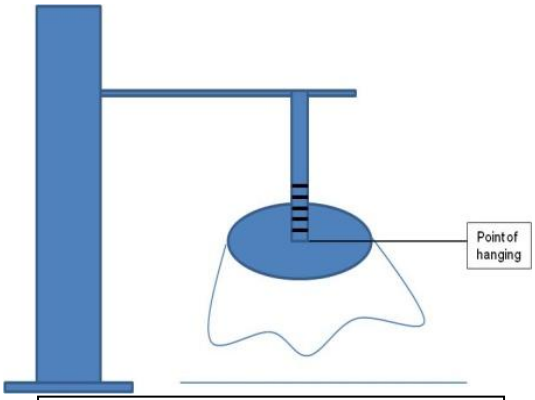


Figure 1: Method for considering different heights.

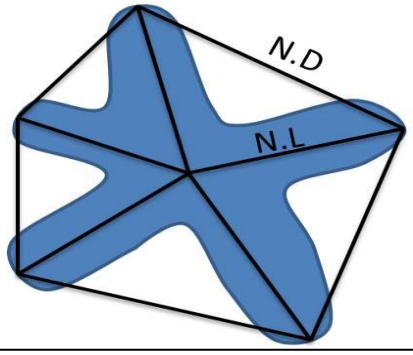


Figure 2: Diagram depicting manual method of calculating node parameters. (N.L-Nodal length, N.D-Nodal distance

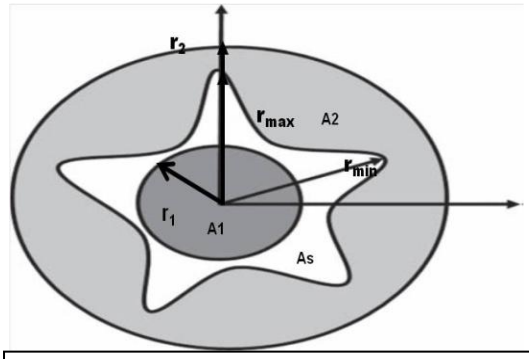


Figure 3: Diagram depicting different measures for calculation of drape

III. RESULTS AND DISCUSSION

The structural parameters of given fabric samples were taken .The end/inch of fabric is kept constant whereas the picks/inch is varied from 36-52.The fabric thickness range 0.046-0.053 cm. The fabric weight is 140-170 gsm. The seven drape parameters are being calculated and summarized in the table 1.The measurement taken on different height of hanging is being depicted. The correlation of these drape parameters with the height of hanging is shown in graphs (1-7). It is clear from the graphs (1, 2, 4) that as the height of hanging the fabric is increasing the drape coefficient and Nodal length shows an increasing trend whereas Drape distance ratio shows decreasing trend. No clear trend is observed Nodal distance, no of nodes ,FDI,Amplitude.Good correlation is found between the height of hanging and Drape parameters such as Drape coefficient (0.71), Nodal length (0.66). Negative correlation is found with drape distance ratio (-0.71). Poor correlation is found between the height of hanging and other drape parameters such as Nodal distance, No. of Nodes, Fold depth index & Amplitude. High correlation is also find between the parameters such as Nodal length & drape coefficient (0.714), Nodal distance (0.736).

Graph 1: Correlation between Height of Hanging and drape coefficient

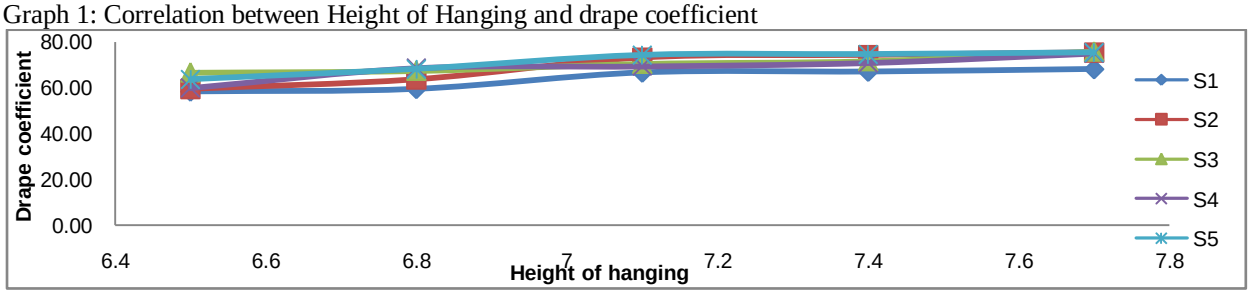
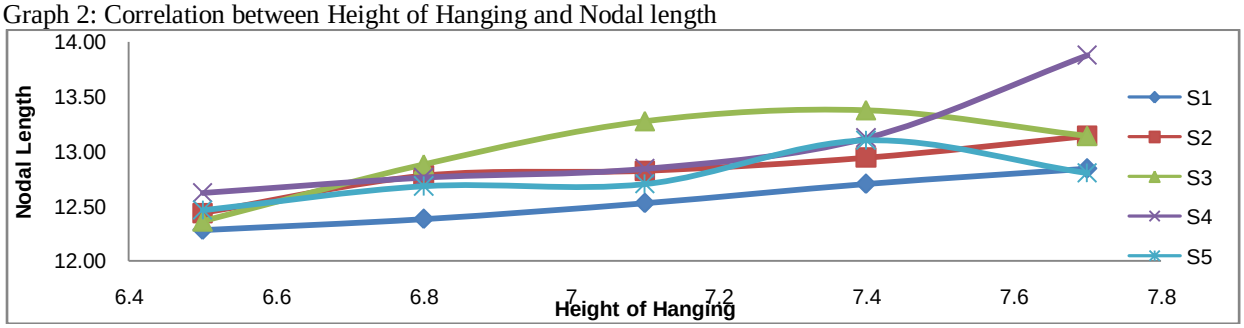


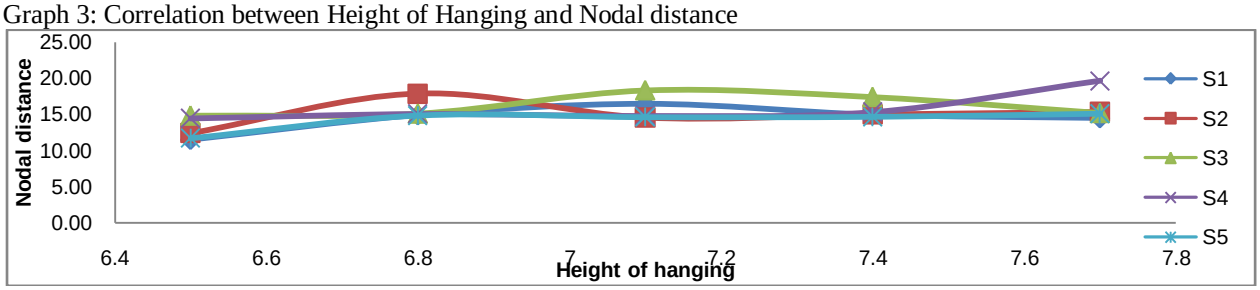
Table: Drape parameters for the analyzed fabrics

Sample	Drape Parameters	Height(cms)				
		6.5	6.8	7.1	7.4	7.7
S1	Drape coefficient	58.34	59.47	66.64	67.02	68.15
	No of Nodes	5	5	4	5	5
	Nodal length(cm)	12.3	12.4	12.5	12.7	12.8
	Nodal distance(cm)	11.5	14.9	16.4	14.9	14.5
	Drape distance ratio	0.341	0.331	0.268	0.264	0.255
	Fold depth Index	14.4	20.8	25.6	64	28.8
	Amplitude(cm)	0.45	0.65	0.8	2	0.9
S2	Drape coefficient	59.47	63.62	73.06	74.19	75.32
	No of Nodes	5	5	5	4	6
	Nodal length(cm)	12.4	12.8	12.8	12.9	13.1
	Nodal distance(cm)	12.4	17.9	14.6	15	15.3
	Drape distance ratio	0.331	0.294	0.213	0.204	0.194
	Fold depth Index	35.2	28.8	25.6	22.4	32
	Amplitude(cm)	1.1	0.9	0.8	0.7	1
S3	Drape coefficient	66.64	67.40	70.41	71.55	75.70
	No of Nodes	5	4	4	5	5
	Nodal length(cm)	12.4	12.9	13.3	13.4	13.1
	Nodal distance(cm)	14.8	15.1	18.3	17.4	15.2
	Drape distance ratio	0.268	0.261	0.235	0.226	0.191
	Fold depth Index	91.2	24	12.8	24	24
	Amplitude(cm)	2.85	0.75	0.4	0.75	0.75
S4	Drape coefficient	59.85	68.53	69.28	70.79	74.94
	No of Nodes	4	5	5	5	5
	Nodal length(cm)	12.6	12.8	12.8	13.1	13.9
	Nodal distance(cm)	14.5	15.1	14.8	15.3	19.6
	Drape distance ratio	0.328	0.251	0.245	0.232	0.197
	Fold depth Index	24	59.2	24	59.2	3.2
	Amplitude(cm)	0.75	1.85	0.75	1.85	0.1
S5	Drape coefficient	63.62	68.15	74.19	74.56	75.32
	No of Nodes	5	6	5	5	6
	Nodal length(cm)	12.5	12.7	12.7	13.1	12.8
	Nodal distance(cm)	11.7	14.8	14.6	14.7	15.1
	Drape distance ratio	0.294	0.255	0.204	0.200	0.194
	Fold depth Index	46.4	94.4	30.4	19.2	32
	Amplitude(cm)	1.45	2.95	0.95	0.6	1

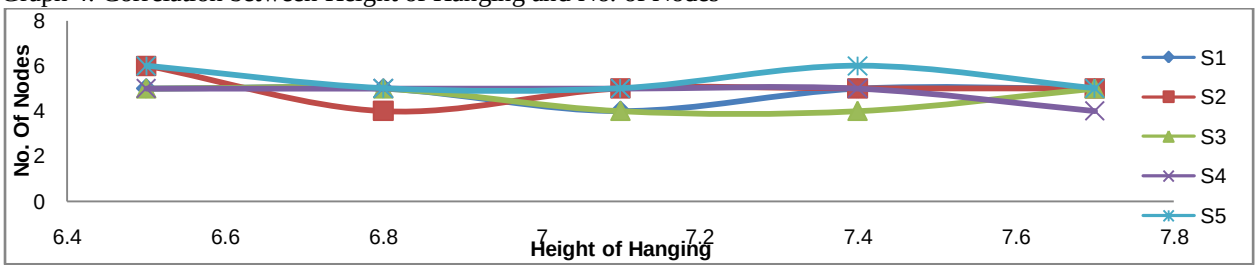
Graph 2: Correlation between Height of Hanging and Nodal length



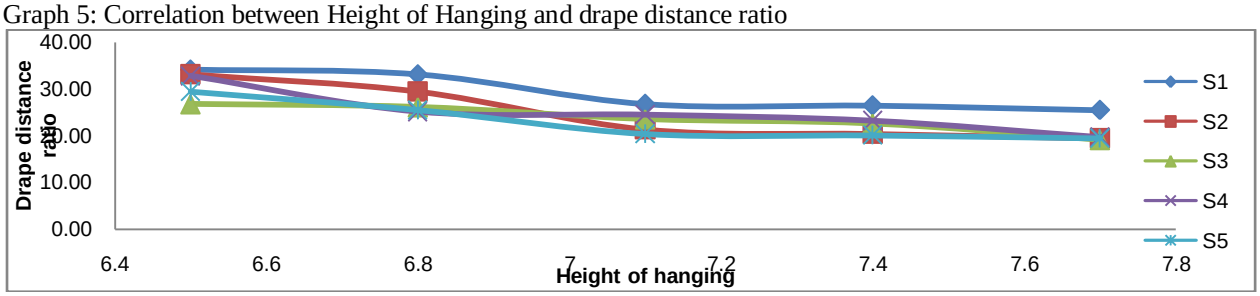
Graph 3: Correlation between Height of Hanging and Nodal distance



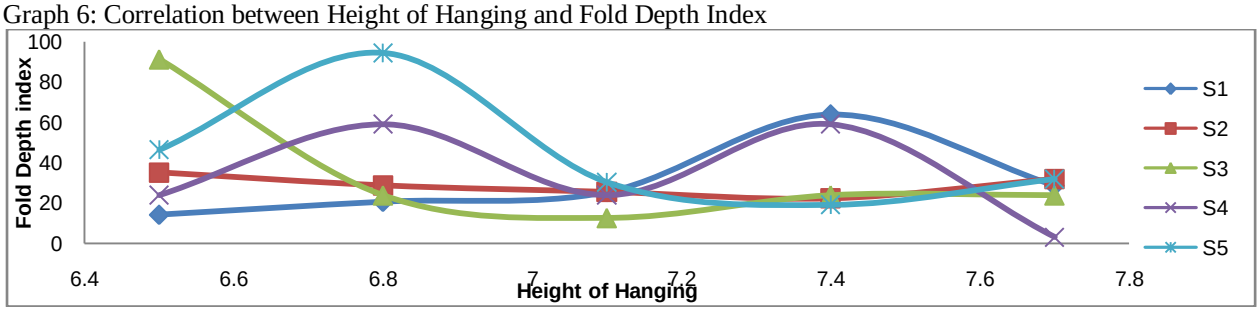
Graph 4: Correlation between Height of Hanging and No. of Nodes



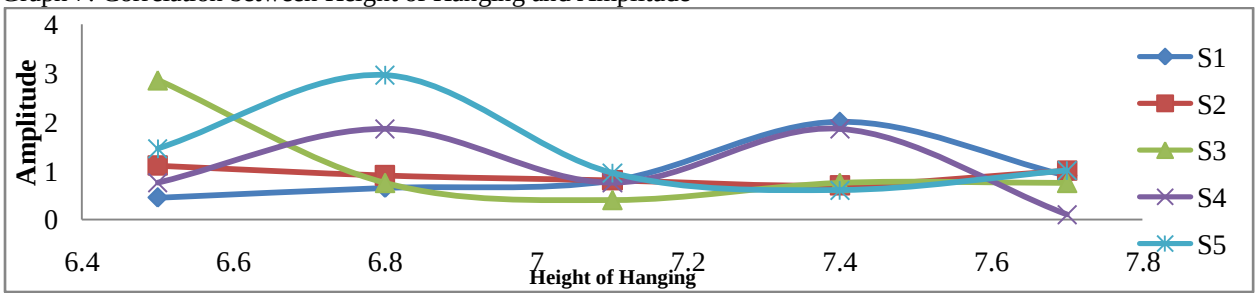
Graph 5: Correlation between Height of Hanging and drape distance ratio



Graph 6: Correlation between Height of Hanging and Fold Depth Index



Graph 7: Correlation between Height of Hanging and Amplitude



IV. CONCLUSION

In this study, the various drape parameters of woven fabrics were measured. The seven drape parameters such as drape coefficient (DC), Nodal length (NL), Nodal Distance (ND), drape distance ratio (DDR), fold depth index (FDI), amplitude (A) and number of nodes (N) were measured by using the ammonia paper sheet. These parameters help to understand the drapability of fabric in terms of its shape. Also, the height dependency of these parameters was studied by taking different hanging heights and analyzes of its effect on these parameters was done. There is a strong correlation between height of hanging and drape coefficient, Nodal length

whereas Negative correlation is observed with drape distance ratio.It enables to understand how the same fabric exhibits different draping behavior at different heights and hence would behave differently as garments on individual of variable heights. It can be helpful for getting a perspective of how the fabric looks when same garment design is manufactured for different height individuals.

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