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Fabric and Garment Drape Measurement - Part 2

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Abstract

Fabric and garment drape were compared using an alternative drape measurement system based on an image analysis technique. Garment drape was investigated using dresses suspended on a mannequin. A graphical user interface was developed to carry out the image analysis and to calculate drape values identifying and determining 21 parameters. A range of fabrics including knitted, woven and nonwoven fabrics were compared in terms of FAST properties, drape coefficient and drape values. Visual assessment of the fabric range was carried out in terms of drape amount and preference. Low agreement was found between individuals with regard to preferred drape amount and high agreement with respect to actual drape amount. Nonwovens were found of better preference over some traditional fabrics. Most of the drape values of fabric and garment were found to have poor correlations.

Keywords: Drape; Fabric; Garment; Drape Values; Image Analysis

1 Introduction

Drape is one of the most important fabric properties and plays an important role in garment appearance. It is defined as "the extent to which a fabric will deform when it is allowed to hang under its own weight" [1].

It is a complex combination of a fabric's physical, mechanical and visual properties which can be evaluated either subjectively or objectively [2]. In 1950, a fabric research laboratory drapemeter (FRL) was developed to measure fabric drapeability objectively [3]. Studies and developments carried out by Chu *et al.* and Cusick are considered to be significant improvements for measuring fabric drapeability and the British standard of drape measurement is based on Cusick's findings [3-5].

Drape coefficient is the traditional parameter used to express the drapeability of fabrics and defined as the percentage of a paper ring (used to project/cast on the shadow of the draped sample) covered by the vertically projected shadow of the partially centrally supported circular sample on a circular disc with smaller diameter [1]. Some investigations have used the weight to express this percentage and others have used the area. Limitations in the traditional method (such as time consuming and errors dependant on operator) have encouraged researchers to seek

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alternative methods to investigate drape such as image analysis which showed good agreement with the drapemeter.

There have been several studies carried out to investigate drape using image analysis. In 1988 Collier *et al.* devised a drapemeter and a voltmeter to measure the amount of light blocked by the tested sample using a base of photovoltaic cells [6]. Typically, studies implementing image analysis in investigating drape are based on one of two approaches to analyze the captured image and calculate the DC%, the first approach uses the number of pixels occupied by the area of the supporting disc, shadow and the outer region [7-10]. The second approach disagrees with the accuracy of the first and instead uses the boundaries of the shadow cast to investigate the drape profile [11-15]. Much research has been carried out to investigate drape focused on: seeking reliable and representative drape parameters and formulas, factors affecting drape, its correlation with physical and mechanical properties, ease of analysing, predicting drapeability, static, dynamic and swinging motion drape. These have been described in Part 1 of this article [16].

During investigations into fabric drape, several parameters have been proposed such as: drape distance ratio [17], drape profile circularity (CIRC), number of nodes, mean node severity and variability of node severity [12] static and dynamic drape coefficients [13] wave amplitude, maximum, minimum, average and variance of amplitude, wavelength [18].

Few researchers have been concerned with investigating the form of the supporting body used to mount the fabric sample on. Most of the drapemeters used in these studies – even the apparel drape studies – were devised with a circular plate to mount the sample on.

Needless to say, if apparel fabric drape is to be investigated, the researcher should check if the supporting surface form and the performance of the fabric suspended on it matches the human body. Investigating apparel drape is completely different from furnishing textiles which may lend itself well to using the Cusick drapemeter.

Some studies employed garment on mannequin in investigations related to drape. Cui *et al.* studied the effect of fabric drapeability on girth ease allowance (GEA) of garment at waist, hip and bust [19]. Moreover, drape simulation studies have been investigating a reliable method for virtual presentation of garment drape. These were based on 3D scanning a garment, measuring its drape parameters followed by using alternative techniques and methods for reconstructing the drape profile [20].

In this study, we are concerned with investigating apparel drape on a suspended mannequin using image analysis. Garment drapeability was compared with fabric drapeability in terms of drape values measured for garment and fabric images. Moreover, nonwoven fabric drape for apparel use was investigated. Nonwovens are often used in the textile (apparel) industry whether as lining fabrics or disposable gowns for medical use. It is rare to find them in the apparel market as shell fabrics of a garment, top, skirt, etc. Their poor drape has been one of the reasons for that rare existence. Perhaps, it is one of the major nonwovens' drawbacks, which impedes using them in the apparel industry as shell fabrics. Therefore, it was considered essential to study and investigate this property, its measurement and its effect on garment appearance. It is proposed to compare the nonwoven drape behaviour with woven and knitted fabrics to help the understanding of nonwoven fabrics' behaviour.

The purpose of this study is to identify and determine an alternative method/system which would produce more dependable parameters than the extant traditional ones and would conse-