

Optimising Young Women's Suit Pattern and Pressure Comfort

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Abstract

The comfort of wearing suits, a staple of formal attire, is crucial for the human body. Studies and surveys indicate that individuals often experience discomfort and shoulder pain due to ill-fitting suits, leading to uneven pressure distribution and subsequent fatigue. Due to the increasing demands of consumers for clothing, the issue of discomfort in the shoulder area of women's suits requires improvement. However, most research on women's suits has focused on aesthetic aspects, with little attention given to the pressure comfort of the shoulder region. This study bridges this gap by examining pattern optimisation and pressure comfort in women's suits. The study uses Martin's measuring instruments and 3D scanning to gather shoulder data from young women. The goal is to understand the typical shape and structure of human shoulders. With this information, we develop a method to optimise shoulder patterns in clothing, ensuring they can be adapted to fit different shoulder types comfortably. The research identifies the relationship between the shoulder slope angles of suit patterns and human shoulder shapes, formulating an equation to link body morphology with pattern design. This study can facilitate designers' understanding of the relationship between human shoulder morphology and clothing patterns, thereby enabling the creation of more comfortable women's suits for consumers.

Keywords: Pressure Comfort; Female Suit; shoulder; Pattern Optimization; Virtual Display

1 Introduction

In today's fashion industry, young professional women are increasingly seeking custom-made clothes that are both stylish and comfortable. The suit, a key piece in business wear, is central to their wardrobe, helping create a professional look while boosting confidence and empowerment. However, the off-the-rack suit market often falls short in terms of fit and comfort because of the wide variety of body shapes and the limited customisation in mass-produced clothing.

This gap highlights a significant issue in the industry's approach to suit design, especially concerning pressure distribution and overall comfort. Improving suit patterns to fit various body types and ensure comfort is a critical area of research.

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1.1 Research on the Current Status of Women's Suits Research

Zhu Wenwen^[1] explored the wide application of women's suit ensembles in diverse lifestyles and the need for improvements in tailoring, highlighting the market position of women's suits and innovation points in sewing techniques. Han Mengge^[2] discussed strategies to optimise the appearance quality of women's striped suit ensembles in terms of fabric performance, style characteristics, structural adjustments, and technical details, and proposed solutions to reduce the impact of stripe displacement on consumer visual perception and purchase desire. Xu Jun^[3] investigated university students' aesthetic needs and preferences for the details of women's suits, finding that fashion, leisure, and uniqueness are key considerations in the design of women's suits. Tang Xi^[4], based on the theory of Kansei engineering, evaluated consumers' perceptual cognition of 12 types of women's suit collars through questionnaires and data analysis, aiming to provide a reference for the design of women's suits. Yu Cuiping^[5] proposed a research scheme that combines Kansei engineering with Quantification Theory I for style design, creating a two-dimensional perceptual distribution space for women's suits and constructing a mathematical model. The model was further validated to effectively translate human perceptual needs into design elements of women's suits, providing a reference for the design and perceptual evaluation of women's suit styles. Wang Sijia^[6] we applied the principles of Kansei engineering to cross-analyse the factors affecting the charm value of women's suits in terms of style, colour, and silhouette. The aim was to determine the relationship between different factors and the charm of women's suits, providing references and suggestions for future design and production.

The demand for both the aesthetic appeal and comfort of clothing is increasingly high; however, research on women's suits tends to focus more on appearance, with few studies addressing the issue of discomfort in the shoulder area of women's suits. Therefore, this paper addresses shoulder pain, a common discomfort, and conducts research on pattern optimisation and pressure comfort.

1.2 The Status of Human Shoulder Morphology

In their study, Zhang Jinhua^[7] and Wang Hongfu found that approximately 79.661% of the subjects had a right shoulder tilt angle distribution between 22.0° and 27.3°. Li Zhao^[8] analyzed the data from body measurements and discovered that the smallest shoulder slope angle among the 64 subjects was 16.09°, while the largest shoulder slope angle was 32.8°. In "Theoretical chapter of clothing modelling," Manjiko Miyoshi^[9] mentioned that the Japanese cultural style prototype's paper pattern had shoulder slope angle values of 22° for the front shoulder and 18° for the back shoulder. Liu Ruipu^[10], in "Principles and Applications of Garment Pattern Design for Women's Clothing," explains that the shoulder slope is the angle formed between the end of the shoulder, the root of the neck, and the horizontal line. It is 19° for women and 21° for men. Yoshi Nakazawa^[11], in his book "The Human Body and Clothing," provides a detailed analysis of the bones and muscles of the shoulder. In his study, Jia Shuang^[12] classified shoulder shapes into three types: flat shoulder type, natural shoulder type, and slipped shoulder type. These classifications were based on the shoulder slope angle, with corresponding numerical ranges of shoulder slope angle values being [3.3°, 18.09°], [18.09°, 21.39°], and [21.39°, 33.8°], respectively.

To optimise the shoulder pattern in clothing, it is essential to first understand the structure of the human shoulder. The literature on shoulder morphology has led to the classification of shoulder slopes for different shoulder types. The standard female shoulder type typically has a shoulder slope angle ranging from around 21° to 23°. My experiment will refer to the content on