Development of Bodice Basic Pattern Algorithm Using 3D Human Body Shape Body Surface Pattern Flattening

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Previous research on body surface pattern flattening were mainly centered on methods of forming triangular or rectangular meshes on the surface of a 3D figure; subsequently laying out and putting the pieces together on a 2D flat surface in order to form a single surface area(Jeong, Hong, & Kim, 2006; Suh, 2009; Yunchu & Weiyuan, 2007). However, for the shape of pattern flattened body surface to resemble the original garment, numerous conditions of constraints and complex rules are required in the process of developing meshes(Hee Ran Lee & Hong, 2005; Suh, 2009). Moreover, it is an uneasy task to apply pattern flattened shapes to garment development without any modification, even if 2D body surface flattened patterns made of mesh pieces are controlled to be analogous to bodice basic patterns as much as possible(Jeong et al., 2006; Kim & Kang, 2003).

Thus, this research has departed from the standard method of flat surface binding of mesh pieces that requires various transformations and restrictions, and instead has attempted to conceive a novel approach that can develop 3D body surfaces into 2D level. Opposed to existing standard pattern flattening method which took utmost reflection of 3D body surface forms, this research placed its center on standardization of 2D flattened pattern forms appropriate for high utilization of final 2D body surface flattened pattern outputs. That is, the ultimate purpose of body surface pattern flattening not only lies on enabling easier categorization of body types with pattern flattening, but also on forming body surface flattened patterns reflecting characteristics of 3D body types to full capacity. It also aims for basic data construction which enables development of diverse garments. For realization of such attempt, analyzing the principle of generating garment patterns from human body in line with clothing construction should be preceded and utilized as basic theorem of this research. Mainly, fundamental contemplation over standard points, cutting lines, divided surface areas of human body is needed, in order to reflect major human body features to the patterns. By analyzing musculoskeletal form of human body, application to flattening pattern was made, and pattern flattening drawing was processed by adding cutting lines to basic lines of original bodice basic pattern drafting method.

The most important standard element in drawing bodice basic pattern is completion of the pattern in a direction which maintains the length of cutting lines and divided surface areas of human body to its utmost level. Accordingly, a calculating formula was devised, with transforming essential cutting lines and divided surface areas measured by 3D virtual program to body surface pattern flattening coordinates based on bodice basic pattern method. Succeeding such complex mathematical computing process, a supplementary program was further designed, which calculates transformed coordinates of flattened patterns when entering appointed length of cutting lines and surface areas of 3D virtual human body shapes.

As a result of applying three types of 3D virtual shape model within the scope of BMI normal weight range(18.5~29.99) to the developed algorithm, it was found that cutting line measures of body surface patterns determined by using final output coordinates, appeared to be within approximately 0.25% error terms. In addition, divided surface areas were shown within 1.8% error for surface including curve areas, and within 0.018% error terms for surface excluding curve areas. This confirms that contrary to errors of 1~2% in length and 1~3% in surface found in preliminary studies, errors in transformed length and surface have been greatly reduced. Nevertheless, by applying intact mathematical calculation results to drafting, armholes and curve areas around the neckline were displayed in an unnatural manner. So if garments are to be produced directly with yielded body surface patterns, it was not adequate to use the margins given by previous garment patterns.

In order to apply body surface patterns developed in this research to garments, there needs to be found a more natural form of pattern curve equations, and further studies should be proceeded on margin settings that are directly applicable to garment patterns. Furthermore, supplementation to the algorithm is required through an expansive research on additional characteristics of body shape features, such as body fat distribution, so that shapes surpassing overweight figures can be examined as well.

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