

Summary of the doctoral dissertation

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“Considerations on the indicator determining the quality of clothing fit to the user's figure using a 3D scanner and CAD system”

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The aim of the doctoral dissertation was to study, how various factors can affect the quality clothing of fit in the CAD system. Three equations on the formability coefficient were considered and three new mathematical models were derived and tested using a software package called Blender. The Blender program was chosen due to its open license which allowed for the introduction of formability coefficients using both C++ and Python languages. The algorithms, which incorporated the formability coefficients, were tested on three materials designed for blouse, differing in material composition, weave and surface weight.

The doctoral dissertation also focused on enhancing the automation of 3D programs by introducing the concept of automatic garment stitching in the virtual environment using only DXF files. Based on theoretical assumptions and literary review, it was discovered that the introduction of the new formability coefficients resulted in an improved quality of fit of the fabric to the human figure in 3D space.

The main reason for choosing this topic was to introduce concepts that could improve the functionality and further the scope of 3D CAD packages, such as improved virtual cloth draping in 3D space to simulate real world draping more accurately. The automation of the 3D sewing process will allow for rapid 3D virtual fitting of clothes in the future. Currently, users of CAD/CAM systems are specially trained people, who are also highly familiar with the use of 3D CAD software. By improving the realism of cloth simulation and by expanding existing functionality, it is possible to make 3D software packages easier and more intuitive for end users to use.

The concept of incorporating formability into current simulation algorithms creates an exciting opportunity for further research and development of 3D programs to improve the simulation of cloth draping to reflect real world draping more accurately, and in turn, to improve the overall accuracy and reliability of virtual garment fitting in general.