CLO3D Fashion Design Software – A Perspective for Virtual Thermal Modelling of Garments

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Abstract

Emerging 3D simulation tools for fashion design offer an opportunity to use their output for thermal simulation of clothing performance. The requirement posed to such software is accurate simulation of air gap thickness and contact area between garment and skin, since these parameters are mainly responsible for heat and mass transfer through the clothing. In this study, 3D garment simulation software - CLO3D - was systematically validated by comparing fabric draping on simple object (Cusick drape test) and complex geometry of anatomic human body (male and female standing avatars) obtained from CLO3D, with the ones obtained from laboratory tests of actual samples. The simulations of Cusick's draping test were compared based on top view photos of fabric, draped on the round table. For the full body and garment simulations, actual garments, identical to the simulated ones, were confectioned and 3D scanned on the stationary manikin; and finally compared for accuracy of the air gap thickness and contact area size. CLO3D showed an excellent simulation accuracy of these parameters, being within natural variability of draping of actual garments (Fig. 1).

CLO3D software opens new horizons for the thermal evaluation of clothing; through virtual simulation of draping clothing in different body postures, during movement and using this information as input to physical models of heat and mass transfer through air and fabric layers. Furthermore, such a series of models can be coupled with a mathematical model of human thermal physiology and thermal sensation; to obtain virtual user feedback in different scenarios before even any prototype has been made.

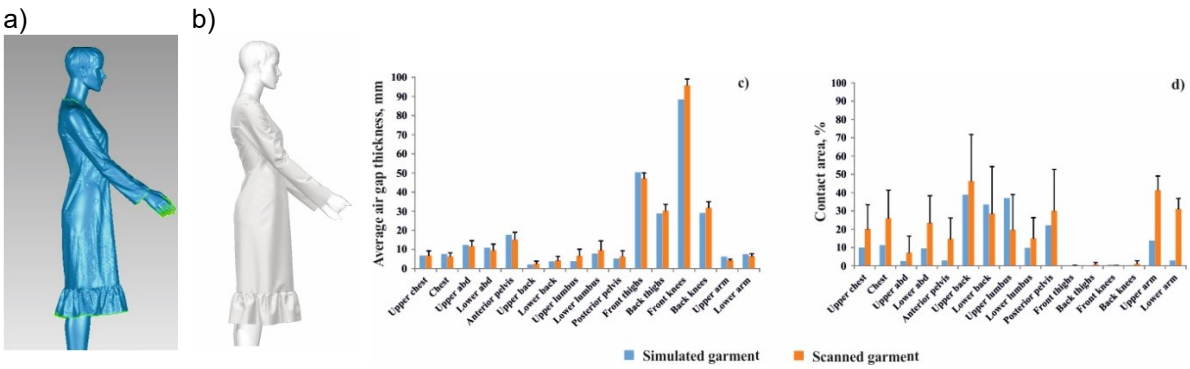

Figure 1. Example of the simple dress 3D scanned on the female manikin (a) and simulated in CLO3D on the identical avatar (b) together with the comparison of the air gap thickness (c) and contact area (d) for selection of the body parts.

Keywords: try-on software, clothing thermal performance, 3D body scanning

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