

# Numerical Simulation Study on the Heat and Mass Transfer Through Multi-Layer Textile Assemblies

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## Abstract

A clothing system should offer the user a period of relatively comfort. However, changes in the ambient conditions over day affect the heat and mass transport in the system, influencing the user comfort perception. In order to gather information to allow the optimization of clothing systems, it is essential to understand the heat and moisture transfer occurring across multi-layer textiles. For this purpose, a numerical study on the coupled heat and mass transport phenomena was conducted, addressing conditions found in clothing systems. The model, which takes into account evaporation/condensation and sorption/desorption cycles, allowed the study of the effect of different parameters over the transport phenomena across multi-layer textile assemblies. Focus was put on the effect of ambient conditions, textile layers properties and layers relative positioning. It was found that the textile porosity, density and tortuosity have a considerable influence on the overall heat and mass transfer.