

## **CFD Modelling of Thermal Manikin Heat Loss for a Comfort Evaluation Benchmark Test**

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### **ABSTRACT**

The CFD modelling of thermal manikin heat loss for comfort evaluation, aims on connecting results from thermal manikin measurements with human experiences to develop a evaluation methodology based on a virtual manikin positioned in a CFD simulated environment. The results can be presented as whole body influence with local information on how the thermal climate varies over the human body.

Computer simulated persons (CSPs) today are different in many ways, reflecting various software possibilities and limitations as well as different research interest. Unfortunately, too few of the theories behind thermal manikin simulations are available in the public domain. Many researchers and companies still use several in-house codes for their calculations. This paper uses an open, relatively uncomplicated, CFD model.

The present modelling is based on the geometries of the mixing ventilation benchmark test developed by Aalborg University. The paper provides information on how to build the geometry of CSP in a commercial CFD code Fluent<sup>®</sup> in that wind tunnel environment. Information and descriptions are also given on how to connect the CSP to the CFD calculations and make the system interact in real time throughout the full iteration process.

This research aims at providing some requirements for the design and development of computer manikins and CFD benchmark tests for comfort evaluation. The main idea is to focus on people. It is the comfort requirements of occupants that decide what thermal climate that will prevail. It is therefore important to use comfort simulation methods that originate from people, not just temperatures on surfaces and air.

### **KEYWORDS**

Computer simulated person, Benchmark, Thermal climate assessment, Clothing-(in)dependence, Comfort zone diagram, Thermal manikin, Mannequin

### **TOPIC**

B Design of room environment

B1 Target and design values in specific applications

B2 Room air conditioning, ventilation and cooling

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