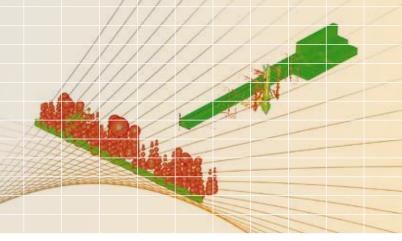# XRG
Simulation GmbH

HumanComfort Library – Including CFD Package

Calculation of air flows using Navier-Stokes equations

The HumanComfort Library is a Modelica library developed by XRG for modelling the thermal behaviour of buildings, as well as vehicle, ship and aircraft cabins. It allows **simultaneous dynamic simulation** of zones and air conditioning systems, as the new HumanComfort Library includes the addition of a CFD-based air model. Using **view factors,** an exact calculation of the thermal radiation between visible surfaces is supported. The new model uses the **finite-volume method** to subdivide the air volume, making it possible to reduce the number of required cells. The calculation is made on the basis of **Navier-Stokes equations,** which achieves **conservation of momentum.**

> CFD Flow Simulation
> 3D Coarse Grid
> Radiation Calculation Using View Factors
> Reduced Costs Through Faster Simulation
   Times

Simultaneous Dynamic Simulation
of Zones and Air Conditioning Systems

The HumanComfort Library makes costly, time-consuming co-simulation unnecessary

HumanComfort Library

With **simultaneous simulation** of air-conditioned zones (e.g. in buildings and vehicles) and the air-conditioning system, it is possible to draw up an **analysis of the interactions** between the system and the comfort in the zone. The effects of, for example, brief system failures can thus be examined.

HumanComfort Library Packages

HumanComfort comprises a USER GUIDE with initial instructions and a general description plus the BASICS PACKAGE with general classes and functions. The following packages are also included in the library:

HumanComfort PACKAGE

Key Figures for Comfort

Thermal comfort analyses applying the following standards: DIN EN ISO 7730; ASHRAE Standard 55; Dutch Thermal Comfort Guideline

HumanComfort WEATHER PACKAGE

Calculation of Environmental Conditions

Calculation of weather data (ambient temperature, soil temperature, global, direct and diffuse solar radiation, atmospheric pressure, humidity, cloud cover, position of the sun)

HumanComfort ZONES PACKAGE

Building and Cabin Models

Stationary applications
(building and ventilation models)

Mobile applications
(vehicle and aircraft cabin models)

HumanComfort CFD PACKAGE

3D Flow Simulation

Three-dimensional CFD coarse grid of cubic cells, each of which can represent a **solid or gas cell.** Calculation of realistic flow conditions using **Navier-Stokes equations.** Standard interfaces at the edges of the grid model for **connection with models from other libraries.** Specification of **symmetric and periodic boundary conditions.** Exact calculation of radiation exchange between surfaces using **view factors.**