MATLAB SIMULINK®

- Matlab R2018b
- CARNOT v.6.3.1
- carnotUIBK v.2.1.0

Short description

carnotUIBK for MATLAB Simulink is a tool for dynamic building energy simulation based on the MATLAB object oriented language and Simulink. It bases on the Toolbox CARNOT. A GUI for a comfortable handle of the input data and the results is available. Import of different kind of data formats is supported. Import functionality for gbXML (B.I.M.), Excel and PHPP are available. A Toolbox for Simulink is provided with the a range of physical calculation models, i.e. hygrothermal models and advanced air flow models. The use of existing CARNOT models is supported.

How to install it?

Instructions for the installation of CARNOT and carnotUIBK can be found HERE (GitHub Repository). At least MATLAB R2018b and a Simulink licence are required!

How is the model structured?

The building energy model is based on an object oriented model created in the environment of MATLAB. Therefore, all relevant MATLAB function can be used for creating, analysing or parametrizing of an building energy model. In Simulink the mathematical representation of the building is created and solved. In a pre-defined building sub-model (middle of the screenshot) the building energy model is automatically created based on the MATLAB building object. Boundary conditions and inputs of controls, i.e. for shading or room temperature, can be forwarded to the building (located on the top left). The HVAC model is created manually or predefined models can be used. A full parametrization is given by the MATLAB building object. A datalogger (bottom) is used to save all relevant outputs of building and HVAC.
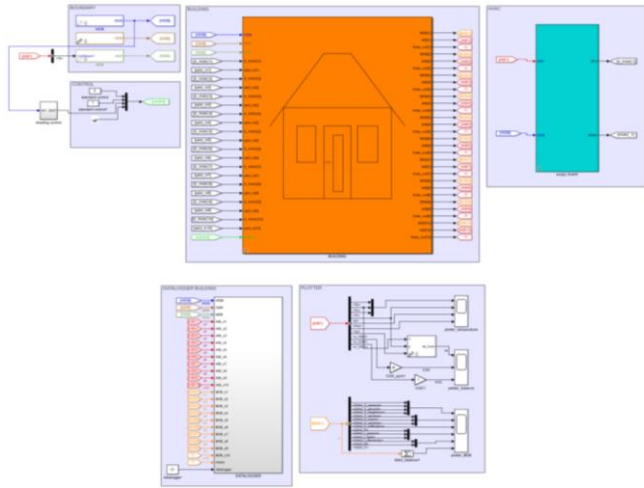
How to run and modify the model?

A project is created in one single folder and the MATLAB building object and the Simulink models are stored in the same folder. In subdirectories, materials, boundary conditions and results are saved in accordance to a given template that can be used to set-up a new project.

Move to the project folder and execute *start_carnotUIBK* in the command window for opening the GUI. In the first tab of the GUI you can create or load a building energy model. It is stored as a object variable *building* in the MATLAB workspace, and you can also modify it directly there. The other tabs in the GUI allows you to insert or import all relevant information for the simulation, i.e geometry, construction, boundary and thermal zones. In the section *Simulate* the simulation can be started and the *Results* tabs assists you in first analyse of the simulation results.
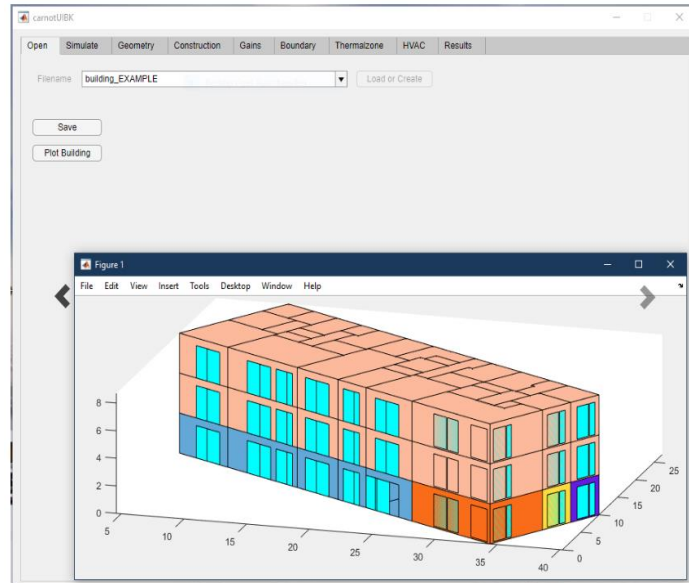
Strengths

- Modern Graphical User Interface;
- Object oriented programming with the opportunity to use pre-defined methods;
- Data management of input data und results;
- Data import from gbXML, Excel and PHPP;
- 1*- and 2*-node models for the thermal zone calculation;
- R-C and hygrothermal model for the opaque structures;
- Standardized post-processing with pre-built functions with the possibility to extend without limitations;
- Simulink library with all blocks and a basic HVAC library;
- Templates for the Simulink model;