Recent Developments of the Modelica Buildings Library for Building Energy and Control Systems

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At the Modelica 2009 conference, we introduced the *Buildings* library, a freely available Modelica library for building energy and control systems.

This paper reports the updates of the library and presents example applications for a range of heating, ventilation and air conditioning (HVAC) systems. Over the past two years, the number of HVAC components models has been doubled, new modeling domains have been added, and various components have been revised to increase numerical robustness. The library can now be used for various applications, including

- performance assessment of various building energy and control systems, using TMY3 weather data,

- modeling of contaminant transport between rooms through multizone air exchange,

- rapid prototyping of new building systems,

- co-simulation using Modelica, EnergyPlus, Radiance and MATLAB/Simulink, as well as real-time operation when linked to BACnet Building Automation Systems through the Building Controls Virtual Test Bed.
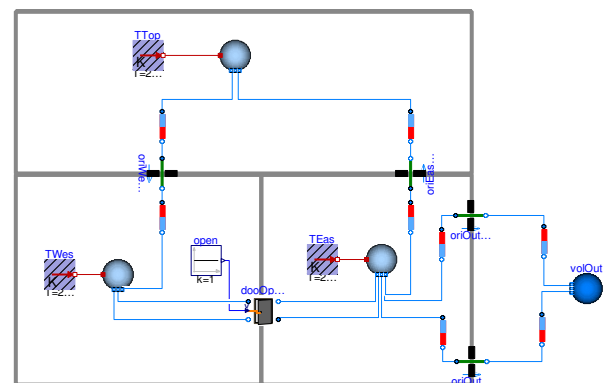
The paper starts with an overview of the library architecture and a description of the main packages. To demonstrate the features of the *Buildings* library, applications are described that include multizone airflow simulation as well as supervisory and local loop control of a variable air volume (VAV) system. The paper closes with a discussion of the current development.
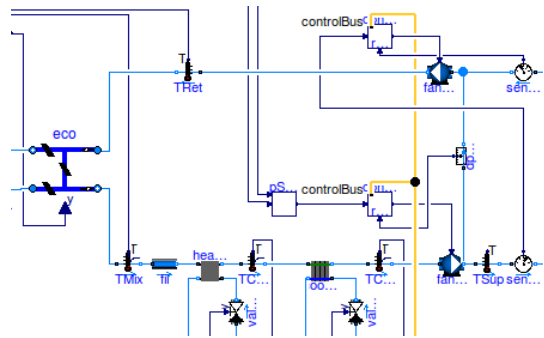
Partial view of a variable air volume flow system.
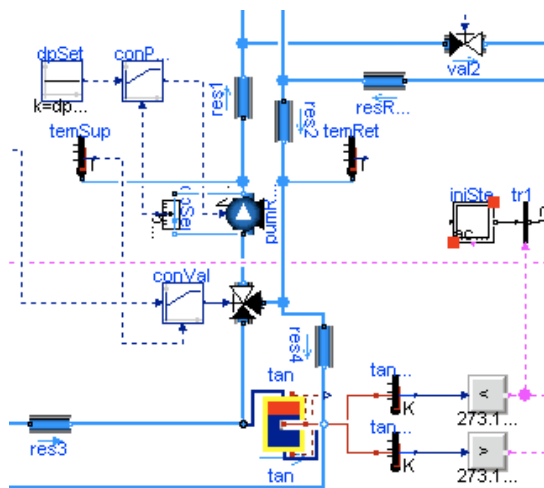
Partial view of a water-based heating system.

Multizone air exchange model.