RTC-Tools 2

A toolbox for Modeling Real-Time Control

Modelica model library

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RTC-Tools 2, *Modelica* model library

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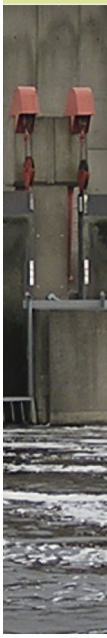


1 How this documentation is set up

1.1 General

We follow the order of the items as ordered in OMEdit. We do not represent the hierarchy of the packages with sections, subsections etc., becaus this would create too many levels. The section headings contain the declaration comments, this means that a meaningful declaration comment must be given.

1.2 *Python* script to generate documentation

Write a *Python* script that reads all `mo`-files and writes one `tex`-file as follows:

- Compose a subsection heading from declaration comment and model name. The model name is set as true type.
- Add a label that is composed of the model name and the prefix “mo:”.
- Add all comments below as text until the first non-comment *Modelica* statement without the comment sign `//`. If there are no comments, do nothing.
- Add an empty line above all section headings.
- The first line in the `tex`-file is `\chapter{Deltares\modelicalibrary}`

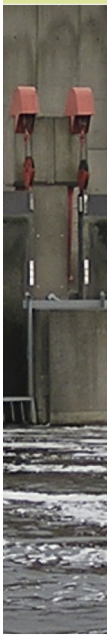
Examples:

- Listing 1.2 produces Section 2.2
- Listing 1.1 produces Section 2.1

Listing 1.1: *Modelica model “Linear”*

```
within Deltares.Flow.OpenChannel.Storage;

model Linear "Storage with linear level-storage relation"
  // The \texttt{Linear} object models a linear storage based
      on the storage equation \ref{mo:PartialStorage} with a
     constant surface area $A$. The storage volume $V$ is
     computed calculated as
// \begin{equation}
  // V = A \times (h - h_\mathrm{b})
// \end{equation}
  // where $h$ is the water level elevation and $h_\mathrm{b}
     $ is the bed level of the storage object.
    extends Internal.PartialStorage;
    // Surface area
    parameter Modelica.SIunits.Area area;
    // Bed level
    parameter Modelica.SIunits.Position H_b;
  equation
    V = area * (HQ.H - H_b);
    annotation(Icon(coordinateSystem(extent = {{-100, -100},
       {100, 100}}, preserveAspectRatio = true, initialScale
       = 0.1, grid = {10, 10})), Diagram(coordinateSystem(
       extent = {{-100, -100}, {100, 100}},
       preserveAspectRatio = true, initialScale = 0.1, grid =
        {10, 10})));
end Linear;
```



Listing 1.2: *Modelica partial model "Storage equation"*

```
within Deltares.Flow.OpenChannel.Storage.Internal;

partial model PartialStorage "Storage equation"
 // The partial model \texttt{PartialStorage} represents the
     linear storage equation
// \begin{equation} \label{eq:PartialStorage1}
 // \frac{\partial V}{\partial t}=Q
// \end{equation} with volume $V$, time $t$ and outflow
    $Q$.
 // This object extents the partial interface model \texttt{
    HQOnePort} (Section \ref{??}).
  extends Deltares.Interfaces.Partials.HQOnePort;
  Modelica.SIunits.Volume V(nominal = 1e6); // volume
equation
  der(V) = HQ.Q;
  annotation(Icon(coordinateSystem(extent = {{-100, -100},
     {100, 100}}, preserveAspectRatio = true, initialScale
     = 0.1, grid = {10, 10}), graphics = {Rectangle(visible
      = true, fillColor = {255, 0, 0}, fillPattern =
     FillPattern.Solid, extent = {{-50, -50}, {50, 50}})}),
      Diagram(coordinateSystem(extent = {{-100, -100},
     {100, 100}}, preserveAspectRatio = true, initialScale
     = 0.1, grid = {10, 10})));
end PartialStorage;
```

2 Deltares *Modelica* library

2.1 Storage with linear level-storage relation `Linear`

The `Linear` object models a linear storage based on the storage equation 2.2 with a constant surface area A. The storage volume V is computed calculated as

$$V = A \times (h - h_{\mathrm{b}}) \tag{2.1}$$

where h is the water level elevation and h_{b} is the bed level of the storage object.

2.2 Storage equation `PartialStorage`

The partial model `PartialStorage` represents the linear storage equation

$$\frac{\partial V}{\partial t} = Q \tag{2.2}$$

with volume V, time t and outflow Q. This object extents the partial interface model `HQOnePort` (Section **??**).