Proposal for standardization of Heat Transfer Modelling in NewThermal Library
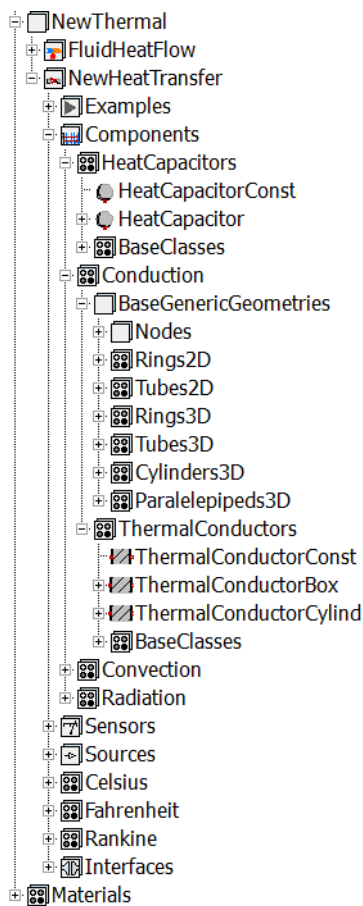
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This article presents the `NewThermal` library that extends the capacities of `Thermal` library from the Modelica Standard Library (MSL) including a proposal for standardizing the use of `Material` models. The new library is intended to decouple the models that collect the equations of heat transfer phenomena from the thermophysical properties of the matters (fluids and solids).

The `NewThermal` library, in the same way that the current `Thermal` library from MSL, is composed of thermal system components to model heat transfer and simple thermo-fluid pipe flow. Nevertheless, the models from the package proposed inherit the thermal properties from `Media` and `Material` models of the fluids and solids involved (either temperature dependent or constant). In this way, the user has three aspects to define; the heat transfer phenomena to be modelled, the geometrical characteristics of the bodies, and the matters involved.

Components inside `HeatTransfer` package are implemented such they can be used for any material model in `Materials` package, in the same way that components from `Modelica.Fluid` were carried out for their use with media models from `Modelica.Media`.

The `NewThermal` library, in addition, provides some general base models for the modelling of 2D and 3D heat conduction in basic solid geometries.

Two examples of use for different domains are presented to illustrate the features of the new libraries.