

## Modelica Training:

# Object-Oriented Modeling and Simulation of Thermal Systems

Dear Sir or Madam,

TLK Thermo GmbH, in cooperation with the Institut für Thermodynamik at the Technische Universität Braunschweig, offers a two-day training regarding object-oriented modeling and simulation of thermal systems.

The training course includes the following:

- Object-oriented and equation-based formulation of differential-algebraic equation systems for the description of thermal systems using the simulation language Modelica ([www.modelica.org](http://www.modelica.org))
- Characterisation of DAE systems and solution processes such as index reduction
- Hybrid (event-oriented) modeling
- Object-oriented analysis and modeling

Discussed Modelica expressions and keywords:

- package, model, connector, flow, stream, inner/outer, if/when, noEvent(), extends, replaceable/redeclare, for, der(), initial equation, stateSelect, fixed, start, input/output, homotopy()
- ODE, DAE, Euler's method, BDF method, residual equations, linear analysis, stiffness, convective variables, chattering, modifier, index reduction, inheritance, polymorphism

During the course, the participants work on the following examples and more, with the assistance of two Modelica experts:

- Formulation of physical balances and conservation laws
- Creation of an object-oriented model library for the simulation of a thermal solar system including evaporation, condensation and flow reversal
- Model library with electronic elements for the object-oriented description of heat transfer mechanisms

After the training course the participants will be capable of independently creating complex Modelica libraries on the basis of an object-oriented analysis. They also receive the necessary mathematical and numerical understanding to formulate "balanced" Modelica models and to recognize and solve numerical

### Contact.

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Modelica Training Description

difficulties in solving. The technical basics of simulation required for understanding complex libraries is taught.

The course examples, necessary media data in TILMedia, and the visualisation tool DaVE for ph-diagrams is provided. In addition, course documentation is distributed as a supplement to written notes.

The training takes place in Braunschweig, beginning at 8:00 am on the first day and ending at 4:30 pm on the second day.

It is preferred that the course participants bring a laptop.

We do our best to meet your specific needs. We are available by e-mail and telephone outside of the course hours as well as between and after the two training sessions for questions related to the course contents.

The cost of the training is € 450,- per day (in total € 900,-). University students as well as PhD candidates receive a discount upon request. Included in the training fees is the course documentation, the above listed software, as well as lunch, drinks and snacks in the breaks.

In the case that you are interested in the training and would like to learn more about the content of the training course, do not hesitate to contact me.

Best regards,

Wilhelm Tegethoff

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