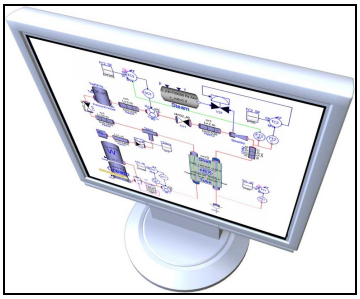
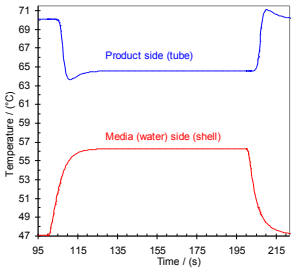
Diploma work at Tetra Pak Processing Systems





Title: Dynamic heat exchanger model for unbalanced flow

Tetra Pak develops, designs and manufactures equipment for processing of milk, juice, soups and many other liquid foods. A large portion of the processing involves heating and cooling in heat exchangers. The equipment is run under various production conditions, for example pre-sterilization, production and cleaning. Due to this, the flow through the heat exchangers may vary from zero to full capacity on one or both sides of the heat exchanger.

To be able to analyse the performance of equipment Tetra Pak has developed a dynamic model library in Dymola (based on the Modelica language). In the library there are models for heat exchangers.

The heat-exchanger models perform well (i.e. accurate and fast) under normal conditions. However, when the flow is strongly unbalanced in the two channels, i.e. flows that differ considerably, the model accuracy will deteriorate if the degree of discretization is not increased very much, implying slow computation.

The purpose of this diploma work is to analyse and suggest improvement of heat-exchanger models to efficiently handle strongly unbalanced flows. Some of the questions to be answered are:

What is the current situation? (literature study)
How does simulation performance depend on the degree of unbalance?
Are there effective alternatives to “straight forward” models and discretization?
What are the pros and cons of alternative models/discretization?

For this task the student/students need to have a strong interest in chemical engineering, dynamic modelling, simulation and/or numerical analysis. Experience in Dymola/Modelica is much valuable.

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Time needed: 20 weeks
Starting date: Any
Location: Tetra Pak in Lund, Sweden