Motivation

- The recovery of energy from secondary sources is essential for the operation of modern pulp & paper mills.
- An efficient secondary heating system reduces the dependency on primary heating with fossil fuel.
- Secondary heating has important influence on costs and the environmental impact.
- The topological complexity of such a process hinders the achieving of control goals, being operation often far from optimal.

The secondary heating system at BillerudKorsnäs Karlsborg AB

- The system exhibited oscillations in certain operating conditions where the root cause was hard to identify.

Analysis of the secondary heating system

- The methods introduced in [1] for the structural analysis of complex processes have been used.
- These methods are integrated in the software tool ProMoVis, recently introduced in [2].

Analysis of the subsystem formed by the tank of warm water

- Conclusions from the analysis:
  1. The level at the tank (Level_WT) should be controlled with the valve u_1.
  2. The temperature at the exit of the tank (Temp_WT) should be controlled with the valve u_5.
  3. There are significant perturbations coming from the loops which are using the valves u_2 and u_7.

Validation of the analysis with plant experiments

- The change of certain setpoints in the plant revealed loop interaction predicted by the analysis.

Conclusions

- The cause of the oscillations exhibited by the system were found, and the control structure was redesigned.
- This case-study validates the analysis methods introduced in [1].
- This study illustrates the potential of the software tool ProMoVis, introduced in [2].