Mathematical Model of Soot Blowing Influences in Dynamic Power Plant Modelling

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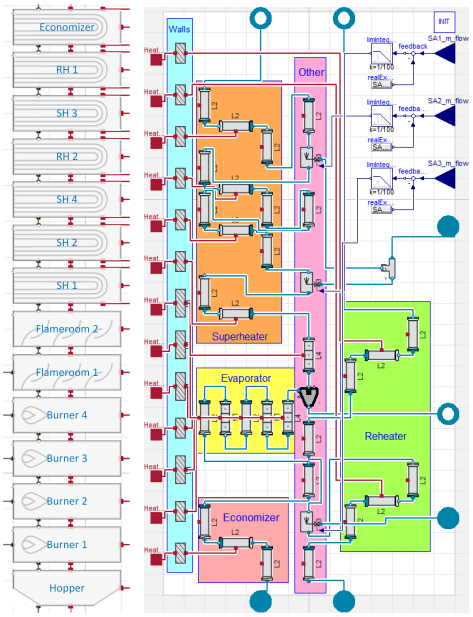
Due to the increasing integration of renewable energy sources in the existing power grid the conventional power plants have to set their focus more on flexibility and grid stabilization than supplying the base load. Since this task was not foreseeable when designing the currently existing power plants, they will have to suffer completely different load scenarios than expected. Dynamic modelling of complete steam cycles is a promising way to study the power plant operation of various future scenarios.

To adapt the model to real power plant behaviour, especially with a focus on control events, the implementation of effects due to steam blown into the gasside part of the boiler in order to detach soot from the heating surfaces (soot blowing) seem to bring great efforts concerning model validity. Furthermore special control optimizations can be done, for example on spray injection at soot blowing events. In this study temperature measurement data is used in combination with a highly detailed boiler model of the 550 MW hard coal fired power plant Rostock to build a mathematical model of soot blowing influence on the different heat exchangers.

The physical model, see Figure 1, has been made using the new open-source library ClaRa.



(a) Gas Side **(b)** Water Side

Figure 1. Gasside and Waterside parts of the developed boiler model

The validity of the mathematical model is tested using a real steady load scenario as inputs for the hybrid model containing both, the physical boiler model and the developed mathematical model for the soot blowing influence.