Modelling and transient simulation of a supercritical coal-fired power plant: Dynamic response to extended secondary control power output

Abstract:
Conventional generation units are subject to a changing economic environment and have to adjust their role for modern society's power generation. With substantial amounts of renewable energy production encountering the markets, thermal power plants are facing an increased need for flexible operation and decreasing revenues from selling electricity. Technical adaptations are necessary, though have to be redeemed within very short time spans to secure the plant's profitability. Dynamic simulation in this context serves as a helping tool to evaluate technical improvements and is an established tool in industry as well as in research institutes. This paper focuses on the detailed modelling of a hard coal-fired power plant using the thermohydraulic simulation code Apros. Characteristic of this model is the implementation of the major part of the control system together with the physical model. The comprehensive model enables detailed dynamic simulations with very small error values to process data, as to be seen in the validation. As an application example, the extension of a qualified load jump for secondary control power is realised. The dynamic simulation is thereby used to clarify necessary modifications in the control system and to assess the implications on plant operation.

Stichworte: