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Dynamic Simulation Studies for Boiler Draft

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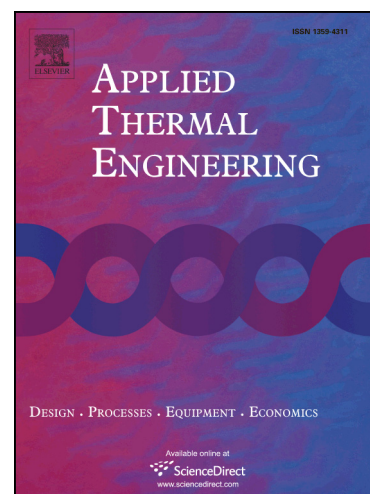
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Dynamic Simulation Studies for Boiler Draft

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Abstract

Increasingly strict NO_x and SO_x emission limits demand the fossil and fuel fired power industry to upgrade their gas treatment system with Flue Gas Desulphurization (FGD) and Selective Catalytic Reduction (SCR) equipment. To compensate for the additional pressure drop the new equipment introduces into the flue gas path due, the existing induced draft (ID) fans need to be replaced with higher head fans or new booster fans. This requires new duct work to connect the equipment. While the new duct work can be designed considering the new operating conditions, the existing duct work may not have been designed with these unanticipated changes and hence may be at risk of implosion and mechanical damage. This paper examines how a high-fidelity process and control model of the air, furnace, and flue gas path of a coal fired power plant is developed for a transient analysis study by using a dynamic simulation platform – DYNsIM. Also included is a case-study which evaluated the processes dynamics of a 225 MW unit. The objective of the study was to ensure design safety by evaluating the process dynamics of the unit prior to retrofitting the unit's draft system. The model, validated with historical data and design data, was used to evaluate the air and flue gas system pressure fluctuations in response to upsets such as fan trips and runaways. The resulting pressures were then available for use as a basis for the duct work design.

Keywords

Power Plant, Dynamic Simulation, DYNsIM

Research highlights

- Dynamic model of 225 MW coal fired power plant consisting of FD Fan, Air Heater, Furnace, prepared with dynamic simulation platform – DYNsIM.
- Demonstration of dynamic model for evaluating the stability of the system

Disclaimer

Various values and numbers used in this paper has been modified for this publication and do not represent the actual operating plant.

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