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Numerical Calculations of NOx Formation during Transient Modes of Tangentially Fired Furnaces

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Abstract: The problem of time variations of NO_x and thermal characteristics in a model of a tangentially fired furnace is numerically investigated. The importance of this problem is mainly due to its relation to the pollutants produced in large boiler furnaces used in thermal power plants. The investigation covered the influence of the number of tripped burners and two cases of the rise in fuel flow rates. The details of the time variations in temperature field are obtained from the solution of the time dependent conservation equations of mass, momentum and energy and transport equations for scalar variables in addition to the equations of the turbulence model. The equations governing the NO_x formation were solved to calculate NO_x distribution. The results show that the temperature distributions are significantly distorted by tripping any of the burners. The results show that tripping two adjacent burners or tripping four burners' results in regions of high temperature gases close to the walls. Heat absorptions in super heater are greatly influenced by the rise in fuel flow rate and burner tripping. It is concluded that the production of NO is mainly achieved at the high temperature regions inside the furnace where the temperature is high. It is also concluded that the NO at the exit plane has any correlations with the temperature at the outlet section.

Keywords: *NOx formation; transient modes; tangentially fired furnaces; tangentially fired boilers.*

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