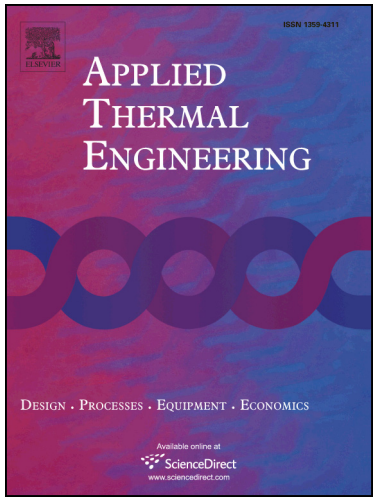

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Investigation on Coal Moderate or Intense Low-oxygen Dilution Combustion with High-velocity Jet at Pilot-scale Furnace

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Abstract: An experiment of coal MILD combustion was carried out in a 0.3MWth down-fire furnace. By increasing the jet velocity to 112m/s, a sufficient internal recirculation was obtained inside the furnace. Therefore the coal MILD combustion could be achieved without highly temperature preheating. Under same condition, a numerical investigation was also carried out as a comparison, and the modeling data can fit the measured data well. Under MILD condition, the peak value of temperature decreased, and the temperature distribution became uniform. Due to high velocity jet, the reaction zone was largely extended and moved toward the exit, in which the reaction rates were decreased for all oxidation reactions. The flame appeared as an integration of dark spark and flame fragment. The NOx emission largely decreased due to the lower flame temperature and deoxidized atmosphere. The carbon burnout rate decreased due to the reduced particle residence time, in turn the CO and oxygen concentration in the exhaust gas also increased. However, the ignition delay increased, and the flame stability decrease without the highly temperature preheating.

Key words: MILD combustion; High jet velocity; Low-temperature preheating; 0.3WM_{th} Down-fire furnace; Pulverized coal.

1. Introduction

The combustion of fossil fuel provides the major resource of the world energy supply, as well as the air pollutant emission. As the respond to the stricter emission legislation, it is necessary to pay more attention to the environmental-friendly combustion technology, in which the Moderate or Intense Low-oxygen Dilution (MILD) combustion is most attractive for its achievement of both low pollutant emission and high combustion efficiency