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Titel des Beitrags: Oxyfuel combustion of lignite in a non-stoichiometric operating two burner arrangement

Abstract: Next to the recirculation rate and that way the oxygen concentration in the oxidizer, the stoichiometry offers an option to control flame temperatures in oxyfuel processes. While using both, non-stoichiometric flames and recirculated flue gas as in the concept of controlled staging with non-stoichiometric burners (CSNBs), the recirculation rate could be reduced drastically. Reducing the recirculation rate in the oxyfuel process is a viable option for more efficient steam generator concepts. The auxiliary power demand, the size of the recirculation equipment and the steam generator size is reduced. The investigations in this paper focus on the interaction of two non-stoichiometric operating pulverized fuel oxycoal burners as used in the CSNB concept. Two different staging strategies have been investigated in detail as well as the influence of dry and wet flue gas recirculation. For that purpose species concentrations have been measured along the flue gas path in the combustion chamber. Additionally emissions at the combustion chamber exit as well as mass and energy balances of the process are reported. The species concentration profiles demonstrate the functionality of the CSNB concept. Either way the oxygen excess or the hydrocarbon excess of the first flame level could be balanced by the contrarily operating second flame level. The staged CSNB concept with low recirculation rate shows comparable
combustion performance with the unstaged oxyfuel process with high flue gas recirculation. However the influences of the individual burner performance and the flue gas mixing, especially in the second burner level, is emphasized in the CSNB concept. In concerns of NOx emissions shows the arrangement, first sub- then over-stoichiometric combustion lower values because the initial NO formation in the first level is much lower. In case of over- and then sub-stoichiometric arrangement the NO reduction by the second sub-stoichiometric flame is low. In case of wet flue gas recirculation with increased vapor concentration in the flue gas atmosphere the heat transfer in the combustion chamber is slightly higher compared to the dry oxyfuel case.

Stichworte: Oxyfuel Oxycoal Stoichiometry Experiments Flame temperature OXY-FUEL COMBUSTION TECHNOLOGY FLAMES

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