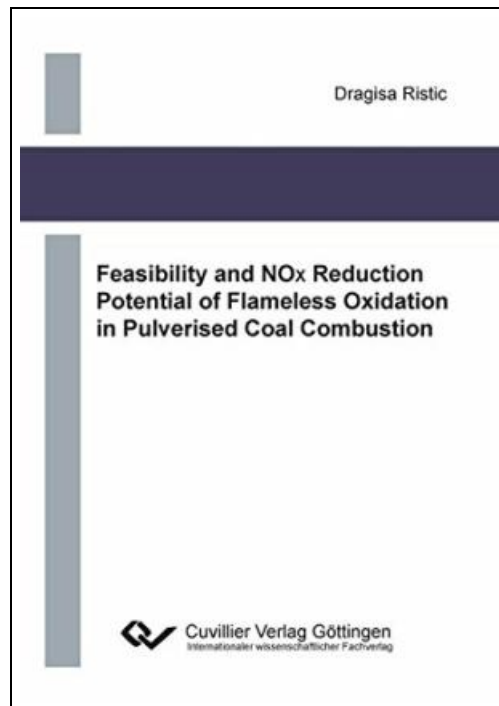


Feasibility and NO_x Reduction Potential of Flameless Oxidation in Pulverised Coal Combustion



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FEASIBILITY AND NOX REDUCTION POTENTIAL OF FLAMELESS OXIDATION IN PULVERISED COAL COMBUSTION

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Cuvillier Verlag Okt 2012, 2012. Taschenbuch. Condition: Neu. Neuware - Since the 1990, the flameless oxidation technology has been successfully proven as low-NO_x combustion technology for gaseous hydrocarbon fuels, and the recent application of this technology to solid fuels such as pulverised coal has also become an area of interest. The objective of this thesis is to evaluate the feasibility and the potential of the flameless oxidation technology in the pulverised coal combustion. Firstly, the experimental studies on pulverised coal flameless oxidation process are conducted at a bench-scale test facility (5 to 10 kW_{th}). In the next step, a suitable burner design in a pilot scale of approximately 300 kW_{th} is developed, built up and experimentally studied. Detailed exhaust gas and in-flame measurements of the temperature and, main species are carried out in order to address the specific aspects of pulverised coal flameless oxidation. Furthermore, to indicate the relevant NO_x reduction mechanisms in the pulverised coal flameless oxidation process. In contrast to the conventional pulverised coal combustion, which has luminous and aerodynamically stabilised flames, the flameless oxidation combustion process has been achieved without a clearly visible flame. In the pulverised coal flameless oxidation mode, intensive internal recirculation is enhanced by a high injection velocity of the combustion air, and thus dilutes the combustion zone and heats up the coal particles in the primary pyrolysis zone. Once the coal particles are rapidly heated up, the processes of pyrolysis and volatile matter release are facilitated. Consequently, local reducing zone is formed, devolatilisation is enhanced, ignition delay is suppressed, combustion stability is improved and NO_x emissions are reduced remarkably. A high internal recirculation of the oxygen-lean hot combustion products into the primary pyrolysis zone promotes an early devolatilisation and a decrease in ignition delay, which are two important factors for NO_x reduction processes. Hence, a valuable...

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