

BURNERS, COMBUSTION AND HEAT TRANSFER

(698) - (*) - SIMULATION OF FLAMES IN THE PACKED BED OF SHAFT KILNS

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For the simulation of thermal processes in shaft kilns it is necessary to know the combustion behavior and the length of the flames in the packed bed. The combustion behavior in a packed bed is quite different to that in kilns and boilers. The radial mixing between the injected fuel and the air is very bad, which results in very long flames. The reactive flow in the gap between the particles can only be calculated for a volume of about one cubic meter because of the required very fine mesh in the contact region of the particles. Therefore, the packed bed has to be approximated as a porous media. It will be shown for a reference bed, in which way the flow profiles for a porous media match with those measured and those calculated for the real flow in the gap. The combustion behavior is simulated for the case, that the fuel and the air are injected axially. The axial reaction rate and the length of the flames are discussed for various gaseous fuels. The studied parameter are outlet velocity of the fuel from the lances (energy flow), excess air number, particle size, number of lances and enrichment of the gas with hydrogen.

Palavras-chave : CFD, packed bed, shaft kiln, flame, Fuel