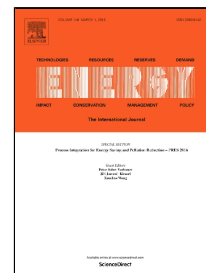


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Assessment of Primary Air on Corn Straw in a Fixed Bed Combustion Using Eulerian-Eulerian approach

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1 **Assessment of Primary Air on Corn Straw in a Fixed Bed Combustion Using**
2 **Eulerian-Eulerian approach**

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8 **Abstract**

9 In this paper, mathematical modelling is conducted on the combustion of corn straw in a
10 one-dimensional bench combustion test rig, and the effects of the primary air flow rate are
11 assessed over a wide range. Due to complex solid combustion mechanisms and inadequate
12 knowledge of the process, the development of such combustion system is limited.
13 Numerical modelling of this combustion system has some advantages over experimental
14 analysis, although the development of a complete model for this type of combustion system
15 remains a challenge. Due to its characteristic properties, modelling of biomass combustion
16 has to overcome many difficulties. One such problem is displaying the process of initiating
17 the combustion in numerical modelling. This study finds that the volatile release and
18 combustion of char increases, thus increasing the amount of primary air up to a critical
19 point, where the starting time of ignition becomes shorter as the primary air flow rate
20 increases. The peak concentration of NO decreases with the increase of primary air,
21 whereas with the increase in the amount of air, there is a reduction in the release of SO₂ as
22 well as a reduction in CO emissions in the bed.

23 **Keywords:** corn straw; fixed bed; combustion; mathematical modelling; primary air.

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