

Analysis for Carbon Combustion and the Energy Loss by Chemical Reactions Into a Rotatory Cement Kiln by CFD: A Study Case

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Abstract

Rotatory cement kilns are wide used for the cement industry, into this kind of kilns occurs chemicals reactions while specific raw material is moving through the Kiln, temperature and time are two important parameters to control thus the type and quality of materials used to formulate the cement. The energy source is the combustion gases obtained by the mineral carbon combustion traveled counter flow. In this study a CFD software Ansys Fluent is utilized and an uniform and homogeneous material bed was considered, this bed was divided into small volumes as “control volumes” which were analyzed as plug flow reactors interconnected in series; for each one of the plug flow reactors the conservation equations for matter and energy and the chemical reaction kinetics were applied to estimate the energy consumed for the first five important chemical reactions into a rotatory cement kiln. In this work temperature profile and gases velocities are presented considering the loss energy through the kiln walls, the efficiency and the combustion products are estimated too.

References

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