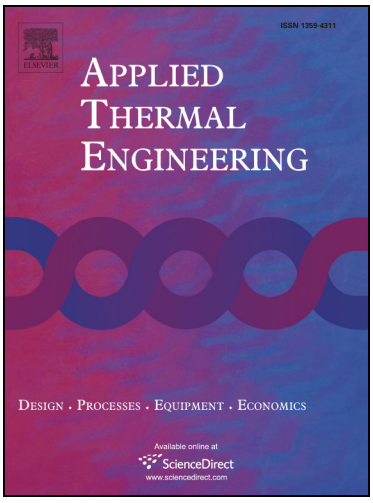

Research Paper

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Three-dimensional numerical simulation of the Co-combustion of Oil Shale Retorting Solid Waste with Cornstalk Particles in a Circulating Fluidized Bed Reactor

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Abstract: In the present study, based upon the Computational Particle Fluid Dynamics (CPFD), the Euler Lagrange method has been used to establish a three-dimensional compressible Circulating Fluidized Bed (CFB) combustion mathematical model. The model considers the heat and mass transfer, and the chemical reactions. In addition, by varying the operating parameters in the simulation, the temperature distribution, gas composition distribution, change in the rate of chemical reaction of the oil shale retorting solid waste with cornstalk particles during CFB combustion were obtained. The temperature distribution obtained by the model was compared with the experimental results. The results show that the numerical simulation results agreed well with the experimental results. The study forms the basis for a better design of fluidized bed reactors in future.

Keywords: CPFD; Combustion characteristic; Modeling; CFB

Introduction

Due to the depletion of fossil resources and growing awareness regarding the ecological environment, sustainable utilization of biomass energy has garnered a lot of research attention in many countries. However, these natural resources are limited and will deplete with the passage