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Segregation of Multi-Sized Biomass Particles in a Horizontal Stirred Bed

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Abstract

A discrete element method (DEM) was used to numerically investigate the segregation of biomass particles (with multi-sized distribution) in a horizontal stirred bed. An analysis of the following factors was performed: agitator rotational speed, reactor diameter, weir height, particle size distribution on particle segregation, and residence time distribution. The results indicated that particle segregation increased with an increased reactor diameter, decreased weir height, and narrower particle size distribution. The influence of the agitator rotation rate was not as significant as the other three variables. When the ratio of the weir height to the reactor diameter was less than 1/2, then the smaller particles had a higher mean residence time than the larger particles; however, when the ratio was 2/3, the opposite result was obtained.

Key words: Biomass particle, Discrete element method, Horizontal stirred bed reactor, Segregation

1. Introduction

Biomass energy is a widely used energy source; as such, biomass-pyrolysis technologies attract much attention because they are a significant way to develop biomass energy. Biomass-pyrolysis has the following benefits: short reaction period,

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