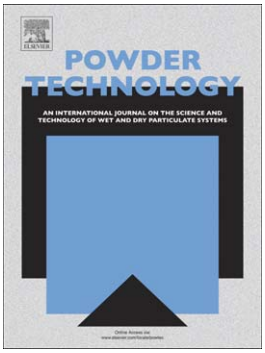

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Simulation of particle flow on an elliptical vibrating screen using the discrete element method

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Abstract The screening process of particle flow on an elliptical vibration screen was simulated based on the discrete element method (DEM). The motion characteristics and screening mechanisms of particles on the screen deck were studied. The effects of the vibration parameters, including the vibration amplitude, vibration frequency, vibration direction angles, motion trace, and the throwing index on the screening efficiency and transport velocity were also studied. The results show that the screening efficiency was under a combined influence of stratification rate and contact opportunities. Generally, the leading factor is the stratification rate at low frequency and small amplitude, and changes to the contact opportunities at high frequency and large amplitude. Furthermore, by comparing the screening performance of different motion traces, the elliptical screen has a relatively high processing capacity while still keeping the screening efficiency good. Besides, the effect of the throwing index on screening efficiency was investigated and presented in curve, which leading to an empirical formula to describe the relationship between them. The purpose of this paper is to provide a better understanding of the screening performance and the theoretical basis for the working parameter settings and optimal design of elliptical screens.

Keywords *elliptical vibrating screen; screening performance; screening efficiency; simulation; discrete element method*

1. Introduction

The vibrating screen is one of the most general pieces of equipment in the separation of granular materials based on size. According to the movement trace, screens can be divided into three types: linear vibrating screens, circular vibrating