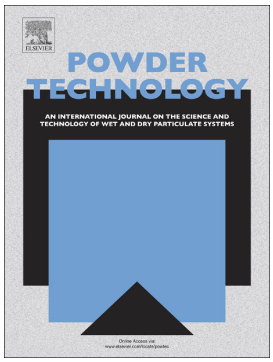

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Evolution process and regulation of particle kinematics and spatial distribution driven by exciting parameters during variable-amplitude screening

Haishen Jiang [a], Jinpeng Qiao [a], Yuemin Zhao [a, *], Chenlong Duan [a *], Zhenfu Luo [a], Chusheng Liu[b], Yongzhu Yang [c] , Jingfeng He [a], LaLa Zhao [b] , Miao Pan [a]

[a] Key Laboratory Coal Processing and Efficient Utilization of Ministry of Education, China University of Mining and Technology, Xuzhou 221116, China

[b] School of Mechatronic Engineering, China University of Mining and Technology, Xuzhou 221116, China

[c] Anshan heavy mining machinery co., LTD, Anshan 114051, China

Abstract: Variable-amplitude screen has been widely used for the classification of particulate materials due to its advantages including large capacity production and good screening performance. The exciting parameters significantly influence the trajectory of the screen surface, particle kinematics and spatial distribution, and screening performance during variable-amplitude screening. Investigation of the optimization and regulation of exciting parameters is necessary because they are the key to realize high screening efficiency of materials. In this study, variable-amplitude screening experiment and test analysis system were constructed to conduct relevant research. Consequently, the material distribution on the screen surface exhibited the spatial evolution process as follows: the material layer was thicker at the feed end, had approximately equal thickness of the material layer, and a thicker material layer at the discharge end with an increasing difference in amplitude. The corresponding screening efficiency first increased and then decreased. Based on the above-mentioned analysis, the method of regulation of trajectory of screen, particle velocity, and material distribution during variable-amplitude screening by adjusting exciting parameters was introduced to realize the variable-amplitude equal-thickness screening and achieve optimum classification performance. Based on the proposed regulation method, the optimum conditions were obtained as follows: f_1 = 4.01 kN, f_2 = 3.09 kN, k_f = 1.3, and l_{reb} = 40%; the corresponding screening efficiency reached a maximum value of 93.11%, and the total misplaced materials reached a minimum value of 2.68%.

* Corresponding authors. Tel.: +0086 0516 83591102. E-mail addresses: ymzhao_paper@126.com (Yuemin Zhao), clduan@cumt.edu.cn (Chenlong Duan).