

工程热物理

回转式干馏炉内影响颗粒混合运动因素的数值分析

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摘要:

以水平回转式干馏炉为研究对象, 采用离散单元法(discrete element method, DEM)建立颗粒运动模型, 接触模型采用Hertz无滑动接触模型, 分别对在其内设置不同形式抄板(直角抄板、弯抄板和直抄板)的混合效果和混合规律进行了数值研究。将大小颗粒间接触数与颗粒间接触总数之比定义为混合质量, 并以此来衡量混合程度, 同时分析抄板形式及转速对混合质量的影响。研究表明, 干馏炉内设抄板时, 混合趋于稳定的时间较短, 抄板形式对混合质量的影响较小; 随着转速的降低, 混合质量曲线越平缓, 波动幅度越小。研究结果对干馏炉的设计和 optimization 具有一定的指导作用。

关键词: 离散单元法 回转干馏炉 混合质量 接触数 抄板形式

Numerical Analysis of Particle Mixing and Movement in Rotary Retorting

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Abstract:

The discrete element method (DEM) was employed to establish a motion model in horizontal rotary retorting. Hertz-Mindlin with no slip model was used to compute contact forces. The mixing effect and pattern were studied in rotary retorting which contains different forms flights (right-angled flights, straight flights and 120° angled flights), respectively. The ratio between small-large contact number and the total contact number was taken as measurement index, also influence of flights forms and rotational speed on mixing were analyzed. The numerical results show that the mixing stable time at rotary retorting containing flights become shorter than without flights. The flights forms have little effect on mixing quality, along with reducing rotating speed, the mixing quality curves tend to be steady and the fluctuation diminishing gradually. The results can guide the optimization and scale up of rotary retorting.

Keywords: discrete element method (DEM) rotary retorting mixing quality number of contacts flights forms

收稿日期 2010-06-17 修回日期 2010-09-13 网络版发布日期 2011-01-27

DOI:

基金项目:

吉林省重大科技发展计划项目(20096034)。

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