

多相流和计算流体力学

## 石英砂流化床床料磨损的数学模型

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**摘要** 针对石英砂流化床床料磨损问题, 从磨损的机理出发, 基于Fleischer关于摩擦磨损的系统能量平衡理论建立了一种磨损数学模型。磨损细颗粒脱离母体颗粒的磨损破坏条件是依据材料动力破坏的最小能量原理。该模型考虑了床料颗粒在流化床的运行特点和颗粒的物理性质, 能够反映流化床床料磨损的一些物理意义, 且模型计算结果与实验数据吻合较好。

**关键词** [磨损](#) [数学模型](#) [流化床](#) [石英砂](#)

分类号

## Mathematic model of attrition of quartzite particles as medium material in fluidized bed

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### Abstract

Quartzite particles, as a bed material, are used in the high density fluidized bed. However, in the operation, a great amount of fines, due to the attrition of quartzite particles, were elutriated, which would result in the decrease of bed material and bed pressure drop, and herein have an impact on the normal fluidization in the fluidized bed. In view of the attrition of quartzite particles, a mathematic model was established based on the Fleischer's system energy balance theory about the friction attrition mechanism. The condition that the fine particles were separated from the parent particles was based on the least energy principle of material dynamic failure. The particle's operation characteristics in the fluidized bed and the particle's physical properties were also considered in the model. This model could explain some factors of the particle's attrition. Moreover, the predicted value from the model was close to the experimental value. Therefore, this study would be beneficial to the engineering application of the high density fluidized bed.

**Key words** [attrition](#) [mathematic model](#) [fluidized bed](#) [quartzite particle](#)

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