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论文

浓相气固高密度流化床内的气泡动力学行为特性

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摘要：

采用试验测量与数值模拟计算相结合的方法，对干法选煤采用的浓相气固高密度流化床内的气泡动力学行为进行研究。对影响床层稳定性和密度均匀分布的气泡尺寸与上升速度进行计算分析，结果表明：以Geldart B类高密度磁铁矿粉作为分选介质，在表观流化气速 1.5 U mf ≤ U ≤ 2.2 U mf 的条件下，气泡沿床高方向与床体轴向的气泡平均直径分布为35 mm< D b <49 mm和 40 mm< D b <61 mm，气泡上升速度范围为40~65 cm/s，试验与模拟结果基本吻合；此时，流化床内各点的密度分布均匀稳定，密度分布标准偏差为0.016 8。因此，调节表观流化气速 1.5 U mf ≤ U ≤2.2 U mf，可以使气泡尺寸和上升速度都保持在合理的范围内，流化床处于最有利于煤炭分选的准散式流态化，分选效果最好。

关键词： 气固流化床；动力学行为；干法分选；数值模拟

Dynamic fluid bubble behaviors in the dense gas-solid fluidized bed with high densities

Abstract:

Experimental measurement and numerical simulation were combined to conduct the research of dynamic fluid bubble behaviors in the dense gas-solid fluidized bed with high densities，which is applied in the dry beneficiation.Mean diameter of the bubbles and their rising velocity were calculated and analyzed，which have a significant influence on the stable condition and uniform density distribution of the fluidized bed.The results indicate that the mean diameters among transverse and axial directions are 35 mm<D b<49 mm and 40 mm<D b<61 mm respectively，and the variation range of their rising velocity is 40~65 cm/s with Geldart B magnetite powder as the separation medium.Meanwhile，the density distribution keeps uniform and steady in every location of the fluidized bed and its standard deviation is 0.016 8.Therefore，the bubble diameter and rising velocity could be maintained to vary in an optimum and reasonable scope by adjusting the superficial gas velocity in the range of 1.5U mf~2.2U mf. The gas-solid fluidized bed stays a sound fluidization which is favorable to coal beneficiation.The high separation efficiency of coal could be achieved on the condition.Besides，the results also indicate that the experimental and simulation approach provide an agreement in the whole calculation process.

Keywords: gas-solid fluidized bed；dynamic behavior；dry beneficiation；numerical simulation

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