

农产品物料高速切割粉碎流场数值模拟与试验 Numerical Simulation of Fluid Field for High-speed Cutting Grinding

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关键词: 切割粉碎机 叶轮 刀片 流场 数值模拟 试验

摘要: 在分析高速切割粉碎机工作原理的基础上, 基于CFD技术, 应用Fluent软件及RNG  $k-\epsilon$  湍流模型对粉碎过程进行流场数值模拟, 分析了粉碎室内部流场的压力与速度分布, 研究了叶轮叶片形状、刀片偏角、叶轮转速对流场的影响, 并对切割粉碎区内物料的压力、运动速度、剪切应变率等性能参数进行分析, 得出转子为直叶片式叶轮, 刀片的偏转角度为 $2^\circ$  时产生的切割粉碎流场最有利于切割粉碎, 叶轮转速对各性能参数的影响呈线性关系。对不同特性物料的试验表明, 该高速切割粉碎机物性适应性强、粉碎效果好。 Based on the analysis of high-speed cutting principle, the numerical simulation of a flow field within the crushing chamber in pulverizing process was performed by CFD technique, and Fluent software, in which RNG  $k-\epsilon$  turbulence model was adopted. The effects of impeller blade shape, blade angle and impeller speed on the flow field were revealed, and the crush velocity, pressure, and shear strain rate were analyzed. The linear relationships between the impeller speed and various parameters were obtained. In case of straight blade impeller with  $2^\circ$  deflection angle the obtained flow field shows the optimal efficiency for cutting crush. The experiments for various materials indicate that the high-speed cutting grinder has the broad prospects with physical adaptability and smashing effect.

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