

基于Fluent的固定床生物质气化炉冷态压力场研究 Analysis of Fixed-bed Biomass Gasifier Cold Internal Pressure Field Based on Fluent

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摘要: 以下吸式固定床生物质气化炉物理模型为研究对象,应用流体仿真软件Fluent,对冷态气化炉在单、双层气化剂配风工况下的床层压力场进行仿真研究。通过气化炉多点测压实验,对仿真结果进行验证。利用 欧拉-拉格朗日方法分析气化炉冷态流场分布特性,根据伯努利方程说明气化炉床层压力场的变化原因。结果表明,仿真与实验结果的误差值在2.5%以内,气化剂配风工况的变化改变了炉内流场,双层气化剂配风使氧化层压力场平均值为14.98 kPa,高于单层配风工况,且轴向压力分布均匀。 Taking the physical model of downdraft biomass gasifier as the research object, fluid simulation software Fluent was used, the pressure field of the gasifier that in the condition of single-layer air-distribution and double-layer air-distribution was comparatively analyzed. By means of multi-point pressure measurement experiment, the simulation results were verified. The Euler-Lagrange model was used to analyze the cold characteristics flow field distribution of gasification. The reason of diversification in pressure field by Bernoulli's equation was discussed. The results showed that the deviation value of simulation and experimental results was under 2.5%. Different air-distribution condition should lead to the changes of flow field in biomass gasifier. Double-layer air-distribution condition made the average pressure in oxidation area of 14.98 kPa, higher than that in the condition of single air-distribution. And also the axial direction pressure distributed equally.

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