

RESEARCH PAPERS

对撞流干燥的实验与理论研究

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摘要 The experiments of one-stage semi-circular and two-stage semi-circular impinging stream drying as well as the vertical and semi-circular combined impinging stream drying were carried out. The velocity distribution and the mean residence time of particles, and the influence of various factors on drying characteristics were studied. A mathematical model of granular material drying in a semi-circular impinging stream dryer was proposed, in which the flow characteristics as well as the heat and mass transfer mechanisms were considered. Reasonable numerical methods were used to solve the equations. Under various conditions, the calculated results agree well with the experimental data. The unsteady-state drying dynamic equation, as well as the variations of drying rate and moisture content versus time were obtained. The results indicate that constant drying rate period does not exist in a semi-circular impinging stream dryer. Appropriate semi-circular stage number and curvature radius, flow-ratio, air velocity, and higher inlet air temperature should be used for enhancing the drying process.

关键词 [impinging stream drying](#) [flow characteristics](#) [drying characteristics](#) [mathematical model](#)

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Experimental and Theoretical Analysis of the Impinging Stream Drying

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Abstract The experiments of one-stage semi-circular and two-stage semi-circular impinging stream drying as well as the vertical and semi-circular combined impinging stream drying were carried out. The velocity distribution and the mean residence time of particles, and the influence of various factors on drying characteristics were studied. A mathematical model of granular material drying in a semi-circular impinging stream dryer was proposed, in which the flow characteristics as well as the heat and mass transfer mechanisms were considered. Reasonable numerical methods were used to solve the equations. Under various conditions, the calculated results agree well with the experimental data. The unsteady-state drying dynamic equation, as well as the variations of drying rate and moisture content versus time were obtained. The results indicate that constant drying rate period does not exist in a semi-circular impinging stream dryer. Appropriate semi-circular stage number and curvature radius, flow-ratio, air velocity, and higher inlet air temperature should be used for enhancing the drying process.

Key words [impinging stream drying](#); [flow characteristics](#); [drying characteristics](#); [mathematical model](#)

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