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论文

光散射法测量颗粒尺寸、浓度的实验研究

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摘要：

为了能够准确快速地求解出微米量级颗粒系的尺寸和浓度，设计了一套基于Fraunhofer衍射，以线阵CCD为接收器件的实验颗粒测量装置。采用Shifrin积分变换方法，分析了给定样品颗粒的粒径分布、峰值、平均值和体积浓度。实验结果表明，与传统的Swithenbank方法采用环形光电管阵列为探测器接收衍射光强来反演颗粒分布方法相比，该方法不需要知道颗粒粒径上下限，各粒径区间间隔等预知信息，而且对粒径、浓度的实验测量值与理论值相差较小，样品峰值粒径为9.8498μm，与给定峰值的相对误差为3.432%,具有较高的测试准确度和较好的测试效果。

关键词： 颗粒尺寸;体积浓度;Shifrin变换;线阵CCD

An experimental research on particle size and volume concentration based on light scattering

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Abstract:

In order to measure the size and volume concentration of particles of several microns accurately and rapidly, an experimental device was designed with a linear array CCD as detector, based on the Fraunhofer diffraction. The Shifrin-transform method was adopted to analyze the particle size distribution, peak value, and mean size and volume concentration. Compared to the conventional Swithenbank conversion method which adopted the self-scanned photodiode array to achieve particle size distribution, the method doesn't need to have precognition information such as upper and low limit as well as interval separation of the particle, and etc. The agreement has been obtained between theory and experiment. The experimental results show that higher accuracy in the measurement of particle size and volume concentration is achieved.

Keywords: particle size; volume concentration；Shifrin inversion；linear array CCD

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