

Optical tomography system based on charge-coupled device linear image sensors: Particle size measurement.

Abstract

This paper discussed an optical tomography system based on charge-coupled device (CCD) linear image sensors. The developed system consists of a lighting system, a measurement section and a data acquisition system. Four CCD linear image sensors are configured around a flow pipe with an octagonal-shaped measurement section, for a four projections system. The four CCD linear image sensors consisting of 2048 pixels with a pixel size of $14\ \mu\text{m}$ by $14\ \mu\text{m}$ are used to produce a high-resolution system. A simple optical model is mapped into the system's sensitivity matrix to relate the optical attenuation due to variations of optical density within the measurement section. A reconstructed tomographic image is produced based on the model using MATLAB software. The designed instrumentation system is calibrated and tested through different particle size measurements from different projections.