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Optical tomography hardware development for solid gas measurement using mixed projection

Abstract

The ability to implement fan beam projection in parallel view in an optical tomography setup is one of the novelties of this research. This design involves a sensor jig specifically designed for parallel applications that does not involve a collimator. Therefore, the fan beam projections can also be implemented in the same sensor jig without difficulty. This method is a very practical solution for overcoming the disadvantages of parallel beam projection. Although the fan beam has its own disadvantages, combining the fan beam approach with the parallel beam approach is expected to further enhance the optical tomography image quality. The image quality can be measured using the Peak Signal-to-Noise Ratio (PSNR) and the Normalized Mean-Square Error (NMSE) parameters. The combination of the two approaches also eliminates the unwanted noise that appears when using parallel beam projection alone.

Keywords

Optical tomography; Fan beams; Peak Signal-to-Noise Ratio (PSNR); Normalized Mean-Square Error (NMSE)