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3D image reconstruction of rising air bubbles using optical tomography system

Juliza Jamaludin[1], **Ruzairi Abdul Rahim**[2] and **Jemmy Mohd Rohani**[3]
[1]Universiti Sains Islam Malaysia, Nilai, Malaysia
[2]Tun Hussien Onn University of Malaysia, Malaysia
[3]Jemmy Mohd Rohani Enterprise, Malaysia

This research presents an application of Charge-Coupled Device (CCD) linear sensor and laser diode in an optical tomography system. Optical tomography is a non-invasive and non-intrusive method of capturing a cross-sectional image of multiphase flow. The measurements are based on the final light intensity received by the sensor and this approach is limited to detect solid objects only. The aim of this research is to analyze and demonstrate the capability of laser with a CCD in an optical tomography system for detecting transparent object existence in crystal clear water. The image reconstruction algorithm used in this research is filtered images of Linear Back Projection algorithm. These algorithms were programmed using LabVIEW programming software. Experiments for detecting rising air bubbles were conducted. A moving object's characteristic such as diameter, path and velocity can also be observed. As a conclusion, this research has successfully developed a non-intrusive and non-invasive optical tomography system that can detect and capture the image of three-dimensional objects in crystal clear water.

juliza@usim.edu.my
juliza.hj.jamaludin@gmail.com