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# Materialdiscrimination by spectral X-ray imaging using the photon counting type detector

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Photon counting type detectors can record incident photons along with their energy.Spectral X-ray imaging with this photon counting type detectors, which measures X-ray photons with each energy, is expected to identify material and improve contrast by utilizing the interaction with substances that differ depending on the energy of X-rays.Due to the characteristics of the X-ray spectrum, the number of photons is small at higher energy bins, and quantum noise may occur.Moreover, since the permeation ability of a substance is less in the lower energy bins than in the higher energy bins, it may not be possible to measure sufficient number of photons.For these reasons, it is necessary to consider whether the interaction between each energy band data and the substance is correctly reflected when using each energy band data in spectral X-ray imaging, and the influence of quantum noise.In this study,a photon counting type radiation detector was used to identify multiple substances.X-ray transmission images of multiple objects of various thicknesses were imaged using a 160 kV X-ray tube, and the images were constructed from energy data of every 10 keV.In the transmission data of all energies, there were some parts that showed the same degree of transmission despite different substances.Therefore, it was confirmed that different substances can be discriminated by creating data obtained from the difference between two types of energy-specific data, comparing the contrasts, and performing analysis.

## Topics

Session C. Applied optics and engineering

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