Contribution ID: **143** Type: **Oral**

Simulation of X-ray scattering of material surrounded by soil

Saturday, 18 November 2023 11:30 (15 minutes)

Backscattered X-ray imaging is a non-destructive inspection technique that uses X-rays scattered back from an object. Compared to X-ray transmission imaging, backscatter X-ray imaging has the advantage that the source and detector can be placed on the same side of the object and is used for inspection of thick objects and structures. However, due to the high attenuation of X-rays by soil, it is difficult to distinguish between objects with different detection levels.X-rays generated underground have their intensity and energy attenuated by interacting with underground materials such as objects, but the degree of attenuation depends on the atomic number of the material. Furthermore, backscattered X-rays are mainly generated by Compton scattering. The cross section of Compton scattering is proportional to the atomic number, and the energy change after Compton scattering depends on the scattering angle, which is a factor that changes the energy of scattered X-rays. In this study, we used simulations to evaluate the improvement in spatial resolution in backscattered X-ray imaging using the energy information of backscattered X-rays.The particle and heavy ion transport code PHITS was used in the simulations. The subject was placed in the ground at a depth of 2 cm and irradiated with a pencil beam measuring 5 mm on each side. To detect scattered X-rays, the detector was placed at three angles (30, 45, and 60 degrees). By changing the X-ray irradiation position, we detected backscattered X-rays near the edges of the object and evaluated the spatial resolution.

Topics

Session C. Applied optics and engineering

Primary authors: Mr IKEDA, Takehiro (Shizuoka University); HOTTA, Takumi; KASE, Hiroki; Dr NISHIZAWA, Junichi (Shizuoka Univ.); TAKAGI, Katsuyuki (Shizuoka University); TABATA, Kento; AOKI, Toru (Shizuoka University)

Presenter: Mr IKEDA, Takehiro (Shizuoka University)

Session Classification: Session at Shizuoka University