Contribution ID: **140** Type: **Invited Talk**

Spatial Representation of Multi-energy 3D X-ray Imaging Using Mixed Reality

Saturday, 18 November 2023 08:00 (30 minutes)

Recent advancements in multi-energy X-ray computed tomography (CT) have garnered significant attention in non-destructive testing (NDT), allowing the segmentation of materials based on variations in X-ray absorption spectra across different energy bands. This study explores integrating multi-energy X-ray CT data with mixed reality (MR) technology to provide a spatial representation of internal structures, enhancing the observer's ability to inspect and understand complex interior details. The method involved capturing CT images of a lithium-ion battery using dual-energy X-ray CT, spanning energy bands from 10 KeV to 150 KeV. The images were processed and visualized in MR, enabling the observer to interact with and manipulate three-dimensional representations of the battery's internal structures. The system allowed for seamless switching and merging of energy bands, highlighting specific components like integrated circuit pins and cable connections at different energy levels. This approach, combining multi-energy X-ray imaging with MR, effectively organizes and presents the increased volume of data obtained, making it a potent tool for precise and intuitive examination of internal structures in NDT. The study demonstrates the potential of MR in enhancing the interpretation and visualization of complex imaging data, providing a significant advancement in the field of NDT and material analysis.

Topics

Session C. Applied optics and engineering

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Session Classification: Session at Shizuoka University