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VISUALIZATION OF MICRO-COMPUTED TOMOGRAPHY AND XRD TEXTURE DATASETS USING VIRTUAL REALITY TOOLS

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Advancements in computer technology have enabled three-dimensional (3D) reconstruction, data-stitching, and manipulation of 3D data obtained on X-ray imaging systems such as micro-Computed Tomography (μ-CT). Likewise, intuitive evaluation of these 3D datasets can be enhanced by recent advances in Virtual Reality (VR) hardware and software. Additionally, the generation, viewing, and manipulation of 3D X-ray diffraction datasets, such as pole figures employed for texture analysis, can also benefit from these advanced visualization techniques. We present newly-developed protocols for porting 3D data (as TIF stacks) into a Unity gaming software platform so that data may be toured, manipulated, and evaluated within a more-intuitive virtual reality environment through the use of game-like controls and 3D headsets. We illustrate this capability by rendering μ-CT data of a polymer test bar at various stages of in-situ mechanical strain. An additional experiment is presented showing 3D XRD data collected on an Aluminum part with microstrain. This 3D data for texture analysis (χ, ϕ, 2θ dimensions) enables the viewer to visually inspect 3D pole figures and detect the presence of residual macrostrain. These two examples serve to illustrate the benefits of this new methodology for multidimensional analysis in the realm of materials science.

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