3D IMMERSIVE VISUALIZATION OF MICRO-COMPUTED TOMOGRAPHY AND XRD TEXTURE DATASETS

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3D visualization is currently having a renaissance in the gaming industry due to new platforms and more intuitive controls. Because many of our datasets within the scientific community can also be 3D in nature, a natural extension of materials analysis would be to view and manipulate such data within a 3D environment for a more immersive experience. Continued advancement in computer hardware along with concurrent software development allow for 3D reconstruction, data-stitching, and manipulation of 3D data obtained on X-ray imaging systems such as micro-Computed Tomography (μ-CT). Additionally, the generation, viewing, and manipulation of 3D X-ray diffraction datasets, such as pole figures employed for texture analysis, can also be enhanced through advances in visualization techniques. We have 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. We present recent μ-CT results on a matrix composite of glass beads embedded in nylon. The user shall be able to tour the 3D data using game-like controls and employ tools to make measurements (e.g. glass bead size). The second dataset shall include 3D rendering of the polymer at various stages of in-situ mechanical strain. The viewer can inspect changes within the composite as it elongated under various stress-loading conditions. The third dataset will show 3D XRD data collected on a thin film sample. This 3D data for texture analysis (ϕ, χ, 2θ dimensions) will illustrate the ability for a viewer to visually inspect 3D pole figures and detect the presence of residual macrostrain. These three examples serve to illustrate the benefits of this new methodology for multidimensional analysis.

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