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IMAGE-BASED SIMULATION TRACK NUMBER 1200

SCOTT A. ROBERTS[*], JOHN P. KORBIN[*], NAGI N. MANSOUR[†] AND KAREL MATOUŠ[#]

[*] Sandia National Laboratories
PO Box 5088, MS-0836, Albuquerque, NM, 87185-0836
sarober@sandia.gov, https://www.sandia.gov/~sarober

[†] NASA Ames Research Center
Moffett Field, CA 94035-0001
nagi.n.mansour@nasa.gov

[#] University of Notre Dame
367 Fitzpatrick Hall of Engineering, Notre Dame, IN 46556-5637
kmatous@nd.edu, https://www3.nd.edu/~kmatous/

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ABSTRACT

Advances in three-dimensional imaging techniques, including x-ray computed tomography and scanning electron microscopy, have enabled insight into as-manufactured materials and components like never before. This abundance of image data has inspired scientists and engineers to perform simulations on computational domains derived directly from this image data, a foundational aspect of the increasingly popular digital twin concept. However, the process converting greyscale three-dimensional image data to a discretized domain suitable for simulation is often arduous and fraught with errors.

In this minisymposium, we explore techniques for improving this image-to-simulation process. Topics of interest include, but are not limited to:

- Computed tomography reconstruction techniques to reduce artifacts
- Image segmentation, labeling, and part identification
- Computer vision and machine learning approaches
- Geometric feature identification and detection
- Domain discretization / mesh generation
- Data compression and model reduction
- Methods for incorporating residual stress and initial internal material state
- Algorithms and numerical methods for solving multi-physics problems on image data
- High performance computing applied to image datasets

- Applications of the above techniques to real-world scientific and engineering applications
- Credibility assessments, including uncertainty quantification and validation