

# Lattice Structures: From Computed Tomography to Simplified Models

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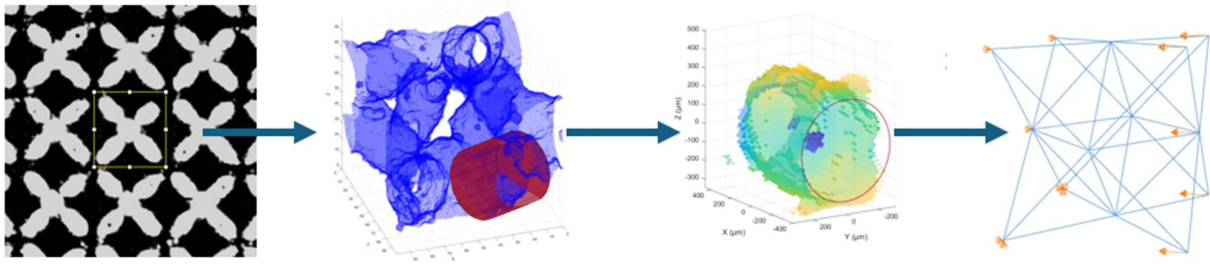
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**Keywords:** Lattice structures; additive manufacturing; simplified models.

**Abstract.** In this paper, finite element models of lattice structures are developed using computed tomography (CT) images of AlSi10Mg T6 specimens produced by laser powder bed fusion (LPBF). The additive manufacturing process introduces geometrical and material imperfections that significantly affect the structural response [1].

Starting from CT scans, struts are geometrically reconstructed and used to generate models with realistic imperfections, following the approach in [2]. These struts are modelled using three-dimensional finite elements and subjected to traction, compression, and bending in order to derive a constitutive model. This model is then implemented in simplified one-dimensional beam elements, enabling the inclusion of imperfection effects with reduced computational cost. A schematic overview of the procedure is shown in Fig. 1.

Single struts and unit cells are analyzed in three configurations: ideal geometries, three-dimensional models with imperfections generated from CT-based geometric distributions, and simplified models with one-dimensional elements. The proposed approach provides an efficient framework for capturing the influence of manufacturing-induced imperfections in lattice structure simulations.



**Figure 1:** Modelling procedure. Struts are identified in the CT scan, geometric features are extracted for a single strut, and a reduced-order finite element model is constructed.

## References

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**Acknowledgments**

This work was carried out within the Space It Up! project funded by the Italian Space Agency (ASI) and the Italian Ministry of University and Research (MUR) under contract No. 2024-5-E.0, CUP No. I53D24000060005.