

Volumetric spline representations and Isogeometric Analysis for Additive Manufacturing

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The emerging V-rep (Volumetric representation) technology for shape representation is based on structures of trimmed tri-variate spline blocks. The representation is well suited for the representation of variable/graded materials and anisotropic material properties integral in AM processes. V-rep is fundamentally different from traditional CAD-technologies, which only represent the boundaries of an object (B-rep). In B-rep CAD, it is assumed that the material is uniform all throughout an object, so only the surfaces must be represented. In Isogeometric Analysis (IgA), traditional shape functions used in Finite Element Analysis (FEA) are replaced by B-splines. Thus, V-rep opens for simulation in AM, based on the accurate shape representation of V-rep based CAD, and the use of higher order elements offered by IgA. This allows the execution of design and analysis operations on the same geometric representation. The mini-symposium aims at addressing solutions and challenges related to the use of V-rep and IGA for solving AM-challenges, including in the context of heterogeneous materials and porous/microstructures geometry.