**Trimmed Trivariate Spline Models from Boundary Represented CAD Models and Element Reparameterization**

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The design of a physical part is normally described as a boundary represented CAD model. However, to perform isogeometric analysis a tri-variate representation in a spline format is required. A block structured model where each block consists of a spline volume is convenient, but not always feasible due to the high geometric complexity of the part. The immersed boundary representation is an alternative format for an isogeometric model, and this is in essence a trimmed volumetric model.

In this talk, we will present an approach to create trimmed volumetric models where the shape of the underlying spline volume is adapted/trimmed to the shape of the initial CAD model. The spline volume will be fitted to the trimming surfaces whenever possible while shape details are subject to trimming. The boundary represented CAD model or a repaired version of the CAD model will serve as a trimming shell in the final model. Essential in the definition of the tri-variate model is an identification of the main surfaces in the boundary model to define boundaries for the spline volume.

A spline volume that is well adapted to the model shape will minimize the number of elements in the model that are trimmed by the boundary and in many cases the elements will be trimmed by surfaces corresponding to fixed parameter planes in the parameter space, but also more complex configurations will occur.

For the computation of quadrature points for isogeometric analysis, we want to use a reparameterization and subdivision approach for the trimmed elements of the tri-variate spline model. The parameter domain of a trimmed element is split into domains that can be approximated by spline volumes. A regular grid of quadrature points in these volumes gives rise to corresponding quadrature points in the interior of the trimmed element. Finding the necessary set of spline volumes is a block structuring task, but on a smaller and less complex domain than the original CAD model.