AN ISOPARAMETRIC APPROACH TO HIGH-ORDER CURVILINEAR BOUNDARY-LAYER MESHING

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As the popularity of high-order methods increases within industrial and academic communities, there is a pressing need for new techniques which permit the generation of curvilinear meshes that align with the underlying geometry. One of the most prominent fields in which high-order methods have been successfully applied is computational fluid dynamics. For complex geometries however, boundary layer meshes of thin but necessarily stretched elements are required which have thus far proven difficult to generate. The purpose of this talk is to present a new technique for boundary layer mesh generation [1], in which an isoparametric representation of a coarse boundary layer mesh is used to produce a refined mesh. Figure 1 demonstrates how the technique works: given a mapping χ from a standard region Ω_{st} to an element Ω^e defining the coordinates of the element, we perform a refinement of Ω_{st} and apply χ to obtain a series of refined elements. We examine the conditions under which the technique is valid and demonstrate how it can be employed to generate curvilinear meshes for complex aeronautical geometries.

REFERENCES

[1] D. Moxey, M. Hazan, S. Sherwin, J. Peiró, "An isoparametric approach to high-order curvilinear boundary-layer meshing", under review in *Comp. Meth. App. Mech. Eng.* (2014).

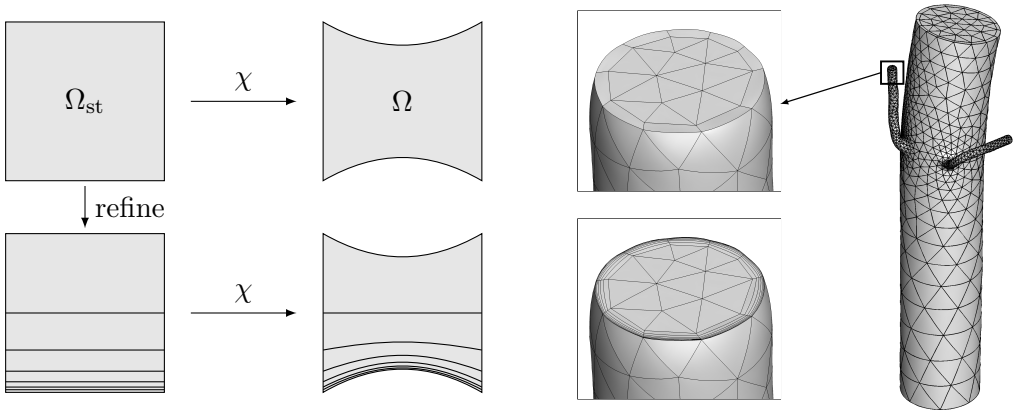

Figure 1: **Left:** overview of boundary layer refinement technique. **Right:** application of the technique to a mesh for an intercostal pair of a rabbit aorta.