Watertight Conversion of Trimmed CAD models

Jiří Kosinka

Johann Bernoulli Institute
University of Groningen
Nijenborgh 9, 9747 AG, Groningen, the Netherlands
e-mail: j.kosinka@rug.nl, web page: http://www.cs.rug.nl/svcg/People/JiriKosinka

ABSTRACT

The powerful framework of Isogeometric Analysis [1] facilitates the exchange of data between tools used for geometric design (CAD systems) and for analysis (numerical simulation). The use of B-splines and NURBS not only for modeling but also for analysis offers advantages over traditional finite element functions, including increased smoothness, faster convergence, improved stability, and, most importantly, it eliminates the need for model (re)meshing.

However, surfaces of arbitrary manifold topology still pose some problems due to either trimming and stitching and/or the presence of extraordinary points where other then the regular number of patches meet. Typically, the presence of extraordinary vertices leads to a reduced order of smoothness, approximation, and convergence rate [2]. Nevertheless, the use of subdivision functions seems to be very promising [3, 4].

In this presentation, we will explore several methods for converting a CAD model to analysis-suitable representations [5], and subdivision in particular [6, 7].

This presentation will be largely based on join work with Jingjing Shen, Neil Dodgson, Malcolm Sabin, and Tom Cashman [5, 6, 7].

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