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Constructions of three- and four-sided surface patches and their demonstration by Web-Mathematica

Abstract. In modeling of free-form surfaces several surface patches have to be composed, while holes may arise, in particular at corner points. A number of algorithms are known for filling holes. The classical four-sided Coons surface is generated from four boundary curves. Three-sided patches from three boundary curves can be generated by Gordon-Coons method.

In this demonstration generalized Coons-type constructions are presented. The four-sided surface is constructed from four rectangular patches, where one boundary curve of each form a curvilinear rectangle. The resulting surface interpolates these curves. Depending on the used weighting functions (here cubic Hermite polynomials) and boundary conditions, the generated surface joins to the constituents with C^0, C^1 or C^2 continuity. Similarly, a triangular patch is defined from three input patches bordering a triangular hole. The used quadratic rational weighting functions ensure tangential continuity between the constituents and the resulting surface along their common boundary curves. Wolframs demonstration project allows running Mathematica programs on the Web-site interactively by changing some parameters within prescribed intervals.

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