

Isogeometric Shape Optimization of Trimmed Shell using Trimmed Surface Analysis

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In the present work, shape optimization of trimmed shell using trimmed surface analysis based on isogeometric analysis is performed. For structural analysis and sensitivity calculation in the shape optimization, trimmed surface analysis [1], which directly utilizes the information of shell surface and trimming curves from CAD program to analysis, is employed. In the design domain, the shell surface is represented by NURBS surface and the trimming curves are represented by NURBS curves. The coordinates of control points of both the shell surface and the trimming curves are defined as the design variables for shape optimization. Using trimmed surface analysis for shape optimization has advantages of not only representing exact geometry, but also eliminating remeshing tasks. In addition, topologically complex shell surface can be treated efficiently without constructing multiple surface patches and the optimal shape of the trimmed shell can be represented smoothly. A number of examples for shape optimization of trimmed shell is performed by the proposed method.

Keywords: Isogeometric analysis, Trimmed surface analysis, Shell structure, Shape optimization, NURBS

[1] H. J. Kim, Y. D. Seo and S. K. Youn, 2009, "Isogeometric Analysis for Trimmed CAD Surface," *Comput. Methods Appl. Mech. Engrg.*, Vol. 198, pp. 2982~2995.