

STRUCTURAL TOPOLOGY FINDING PROBLEM BY SIMULTANEOUS OPTIMIZATION
WITH RESPECT TO SHAPE AND THICKNESS

Computational morphogenesis of free surface shells (Part2)

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The scheme of computational morphogenesis for the shell structures with free curved surface is proposed, where shape, distribution of thickness and topology can be simultaneously optimized.

In the proposed scheme, distribution of thickness is discretized based on those values at each node, and Non Uniform Rational B-Spline (NURBS) is utilized by which the number of unknowns can be controlled while the high degree of freedom for expression of the shape of the curved surface and distribution of thickness are maintained.

Moreover, the contour lines with respect to shell thickness over the shell surface are utilized by which topology of shell structures can be not only scraped but also grown up. By using this method, shell structure optimized with respect to not only shape and shell thickness but also topology can be obtained.

The problem in question has been mathematically formulated as strain energy minimization problem of which coordinate of NURBS control point with respect to the shape of the curved surface and distribution of thickness are adopted as the design variables and numerical examples are presented where the effectiveness of the proposed scheme is investigated.