Désidéri, Jean-Antoine; **El Majd, Badr Abou**; **Janka, Aleš**
Nested and self-adaptive Bézier parameterizations for shape optimization. (English)
Zbl 1123.65303
J. Comput. Phys. 224, No. 1, 117-131 (2007).

Summary: This article is a sequel of the work of *J.-A. Désidéri* [Hierarchical optimum-shape algorithms using embedded Bézier parameterizations, in: Y. Kuznetsov et al., (Ed.), Numerical Methods for Scientific Computing, Variational Problems and Applications, CIMNE, Barcelona (2003)], in which we defined formally a hierarchical shape optimization method based on a multi-level shape representation by nested Bézier parameterizations (FAMOSA), and of *J.-A. Désidéri* and *A. Janka* [Multi-level shape parameterization for aerodynamic optimization - application to drag and noise reduction of transonic/supersonic business jet, in: E. Heikkola et al., (Ed.), European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2004), Jyväskyla, 24–28 (2004)] where we conducted some preliminary numerical experiments of shape optimization in aerodynamics.

Here, we are testing the full multi-level optimum-shape algorithm (analogous in logical structure to the classical full multigrid method). Second, we propose a technique for parameterization self-adaptivity. Both methodological enhancements are assessed by novel numerical experiments on an inverse shape model problem, confirming both are very effective.

MSC:

65K10	Numerical optimization and variational techniques
49Q10	Optimization of shapes other than minimal surfaces
49M37	Numerical methods based on nonlinear programming
76N25	Flow control and optimization for compressible fluids and gas dynamics
76M25	Other numerical methods (fluid mechanics) (MSC2010)

Keywords:

numerical shape optimization; compressible aerodynamics; multi-level optimum-shape algorithm; multigrid method; numerical experiments

Software:

FFSQP(f77); TAPENADE; Wesseling

Full Text: DOI

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