6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11 – 15 June 2018, Glasgow, UK

ISOGEOMETRIC STABILITY ANALYSIS OF THIN-WALLED STRUCTURES FOR TRIMMED NURBS MODELS

Y. Guo[1], H. Q. Do[2] and M. Ruess[3]

[1] College of Aerospace Engineering, Nanjing University of Aeronautics and Astronautics, #29 Yu Dao Street, Nanjing, 210016, P.R. China, yujieguo@nuaa.edu.cn
[2] Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology, Mekelweg 2, 2628 CD Delft, The Netherlands, huy78.do@gmail.com
[3] School of Engineering, University of Glasgow, Ranking Building, Oakfield Avenue, Glasgow, G12 8LT, UK, martin.ruess@glasgow.ac.uk

Key Words: *Shell Buckling, Isogeometric Analysis, Trimmed NURBS, Imperfections.*

The load carrying capacity of thin-walled structures is known to be significantly influenced by stability aspects such as buckling. A reliable prediction of buckling phenomena requires a robust and accurate analysis tool and consideration of a number of inherent structural imperfections which often dominate the overall non-linear elastic response [1].

In this contribution, we present buckling and post-buckling problems of thin-walled structures in the framework of isogeometric analysis of isotropic and laminate composite shells considering geometric imperfections. Our approach exploits the higher order approximation and continuity properties of NURBS modelled shell structures and considers arbitrary openings and cut-outs, as common in industrial applications, on the basis of the finite cell method [2]. The latter proved to be an efficient fictitious domain extension to isogeometric analysis in the context of trimmed NURBS geometries [3]. In particular, the fictitious domain extension allows for a simple and flexible consideration of multiple cut-outs of arbitrary shape from the shell body and at arbitrary location without any re-meshing. Thus, it provides a powerful tool for the systematic study of the buckling tendency of industry relevant models. We will present a number of challenging shell buckling problems to reveal and assess the reliability and accuracy of a fictitious domain extended isogeometric analysis approach of geometric imperfect thin-walled structures.

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