Mesh Generation and Isogeometric Analysis

J.I. López⁽¹⁾, M. Brovka⁽¹⁾, J.M. Escobar⁽¹⁾, J.M. Cascón⁽²⁾, A. Oliver⁽¹⁾, J. Ramírez⁽¹⁾, G.V. Socorro⁽¹⁾, E. Rodríguez⁽¹⁾, G. Montero⁽¹⁾ and R. Montenegro^{(1)*}

- ⁽¹⁾ University Institute for Intelligent Systems and Numerical Applications in Engineering, SIANI, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain, *rafael.montenegro@ulpgc.es, <u>http://www.dca.iusiani.ulpgc.es/proyecto2012-2014</u>.
- ⁽²⁾ Department of Economics and History of Economics, Faculty of Economics and Management, University of Salamanca, Spain, <u>http://campus.usal.es/~sinumcc</u>.

Abstract

We present advances of the meccano method [1,2] for tetrahedral mesh generation and volumetric parameterization of solids. The method combines several former procedures: a mapping from the meccano boundary to the solid surface, a 3-D local refinement algorithm and a simultaneous mesh untangling and smoothing. The key of the method lies in defining a one-to-one volumetric transformation between the parametric and physical domains. Results with adaptive finite elements will be shown for several engineering problems. In addition, the application of the method to T-spline modelling and isogeometric analysis [3,4] of complex geometries will be introduced.

References

- R. Montenegro, J.M. Cascón, J.M. Escobar, E. Rodríguez and G. Montero, An automatic strategy for adaptive tetrahedral mesh generation, Applied Numerical Mathematics, 59, 2203–2217 (2009).
- [2] J.M. Cascón, E. Rodríguez, J.M. Escobar, R. Montenegro. Comparison of the meccano method with standard mesh generation techniques. Engineering with Computers, 1–14, published on-line, DOI 0.1007/s00366-013-0338-6 (2013).
- [3] J.M. Escobar, J.M. Cascón, E. Rodríguez and R. Montenegro, A new approach to solid modelling with trivariate T-splines based on mesh optimization, Computer Methods in Applied Mechanics and Engineering, 200, 3210-3222 (2011).
- [4] M. Brovka, J.I. López, J.M. Escobar, J.M. Cascón and R. Montenegro, A new method for T-spline parameterization of complex 2D geometries, Engineering with Computers, published online, DOI 10.1007/s00366-013-0336-8 (2013).