The Meccano Method for Mesh Generation and Solid Parameterization

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In this conference, we present the main advances in the meccano method, which was introduced by the authors in 2006 for tetrahedral mesh generation. References related with the meccano method can be seen in [1-9]. The main characteristic of the method is the simultaneous construction of a volume mesh of a solid and its volumetric parameterization.

The method requires the information of the solid geometry that is defined by its surface, a meccano, i.e. an outline of the solid defined by connected polyhedral pieces, and a tolerance that fixes the desired approximation of the solid surface. The method builds an adaptive tetrahedral or hexahedral mesh of the solid (physical domain) as a deformation of an appropriate mesh of the meccano (parametric domain). The main stages of the procedure involve an admissible mapping between the meccano and the solid boundaries, a nested mesh refinement and a simultaneous untangling and smoothing algorithm.

On the one hand, a brief description of the method will be introduced. On the other hand, we will show several results for solid modeling and numerical simulation, by using the finite elements and isogeometric analysis.

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