

Master project, 2016-2017

— Application of isogeometric analysis (IGA) in electromagnetic modelling —

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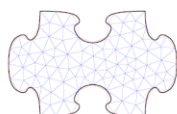
Context

Isogeometric analysis is a numerical approach recently developed since 2005 . This approach offer a possibility to integrate in the finite element code. The geometric representation used for IGA for the surface representation is higher order differentiable, so better accuracy.

Objective

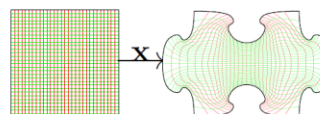
The aim of this work is to make the first electromagnetic modeling using IGA. The IGA source code is igafem (free), the finite element code (CARMEL) is available at L2EP. The student will test the IGA on the Fibonacci cube model and compare the IGA with the classical mesh.

Finite element analysis (FEA)



- Triangulate the domain Ω .
- The boundary is not exact.

Isogeometric analysis (IGA)



- Parametrize the domain Ω .
- The boundary is exact.

Work steps

An important analytical work and bibliographic research are required. Basic knowledge about the finite element method is essential.

Key word

Isogeometric, finite element method

References

[Hughes] T.J.R Hughes, J. A. Cottrell, Y. Bazilev "Isogeometric analysis: CAD, finite elements, NURBS, exact geometry and mesh refinement", *Computer Methods in Applied Mechanics and Engineering*, vol. 194, issue 39-41, October 2005, pp. 4135-4195
 [Nguyen] VP Nguyen, C. Anitescu, S.P.A. Bordas, T. Rabczuk, "Isogeometric analysis: An overview and computer implementation aspects", *Mathematics and Computers in Simulation*, Volume 117, November 2015, Pages 89–116.