Abstract

Shape Optimization with Isogeometric Analysis (IGA) has gained popularity in recent years, due to the prospect of seamless integration of such optimization strategies into already existing CAD software. This is owing to the fact that the optimization is performed directly on the controlpoints of a spline parametrization, and the optimized design can therefore readily be imported into CAD software for post processing.

One of the challenges in IGA in general is to go from a spline representation of the boundary of a domain, to a parametrization of the interior, which will be the computational domain on which to perform the analysis. This is of special importance in shape optimization, since we not only need a good initial parametrization, but we also need to maintain it in every iteration of the optimization algorithm whenever the shape is updated.

In this work we will compare a couple of different parametrization strategies for the application of shape optimization. The parametrization strategies will be based on nonlinear optimization performed on the inner controlpoints. We will consider the shape optimization of a metallic nano-antenna, where the objective is to concentrate electrical energy in a small target region, as a model problem. We will go on to test the different parametrization strategies on this problem.

The methods are implemented for multipatch geometries, using the IGA library G+Smo and the optimization library Ipopt.