

Shape Optimization for additive manufacturing From micro to mezo structures

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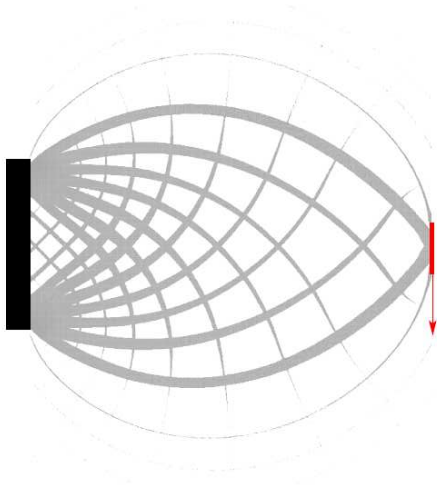
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ABSTRACT

Additive manufacturing consists in building objects layer by layer. It presents several advantages over traditional processes. In particular it allows for the realization of pieces with complex designs out of reach of more conventional techniques. In order to fully take advantage of those features, automatic design methods have to be adapted or new ones have to be invented.



The aim of this talk is to present a recent attempt in this direction that we called unhomogenization. The homogenization method consists to determine the optimal composite shape of a shape optimization problem. Unfortunately, such a solution is useless as it is made of infinitely small micro-structures. We propose a method that allows to construct shapes containing meso scale details (adapted to additive manufacturing) that are almost as optimal of the solution given by the homogenization method.

We will present some preliminary results in dimension two of an optimization method over locally periodic composite. They will be illustrated by numerical examples as the almost optimal cantilever pictured on the left.