

One-dimensional elliptic design problems: numerical approximation and application to thin beams

In this talk we study an optimal design problem for a two phase material in dimension one from a numerical point of view. It is well known that this type of problems have no solution in general and therefore it is necessary to introduce a relaxed formulation. However, if we consider a finite dimensional version of the design problem we can apply stronger compactness results which allows us to prove the existence of solutions. Then, when trying to obtain an approximate solution, we can choose between discretizing the relaxed problem or the unrelaxed one. We obtain error estimates which prove that both discretizations converge, however the convergence is faster for the discretization of the relaxed problem. We show the relationship between this design problem in dimension one and the analogous design problem in a thin beam.