Gradient-free perimeter approximation for topology optimization and domain partitioning

Samuel Amstutz
École Polytechnique

I will present a Gamma-convergence approximation of the perimeter of a set built upon the solution of an elliptic PDE. I will discuss the advantages and drawbacks of this approach compared with other functionals, at first to address topology optimization problems with perimeter control. I will emphasize the specific mathematical properties and algorithmic issues, showing in particular how the variational formulation of the PDE can be exploited to design alternating minimizations schemes. Then I will explain how those results and methods, through combinatorial and duality techniques, can be adapted to multiphase optimal partitioning problems with an energy term consisting of a weighted sum of measures of interfaces. Problems of hydrostatics with surface tensions will be shown as examples.