A Numerical Method for Optimal Error Estimates in BVPs and Robust Optimization

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Abstract: Our recently introduced numerical solution method for general semi-infinite optimization problems with convex lower level problems admits a large number of applications, among them the determination of optimal error bounds in the defect minimization method for elliptic boundary value problems, and the solution of robust optimization problems (for details and more examples see [1]).

The method bases upon a reformulation of the semi-infinite problem as a Stackelberg game and the use of regularized NCP functions. This approach leads to central path conditions for the lower level problems, where for a given path parameter a smooth non-linear finite optimization problem has to be solved. The solution of the semi-infinite optimization problem then amounts to driving the path parameter to zero.

We give convergence properties of the method and illustrate it with a number of numerical examples. The method is easy to implement, and our examples show that it works well for high dimensional index sets.

[1] O. Stein: *Bi-level Strategies in Semi-infinite Programming,* Kluwer Academic Publishers, to appear.

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