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Abstract

The convex feasibility problem is to find a common point of a finite family of closed convex subsets. In many applications one requires something more, namely finding a common point of closed convex subsets which minimizes a continuous convex function. The latter requirement leads to an application of the superiorization methodology which is actually settled between methods for convex feasibility problem and the convex constrained minimization. Inspired by the superiorization idea we introduce a method which sequentially applies a long-step algorithm for a sequence of convex feasibility problems; the method employs quasi-nonexpansive operators as well as subgradient projections with level control and does not require evaluation of the metric projection. We replace a perturbation of the iterations (applied in the superiorization methodology) by a perturbation of the current level in minimizing the objective function. We consider the method in the Euclidean space in order to guarantee the strong convergence, although the method is well defined in a Hilbert space.