ON THE CIRCUMCENTERED-REFLECTION METHOD FOR THE CONVEX FEASIBILITY PROBLEM

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Abstract

The ancient concept of circumcenter has recently given birth to the Circumcentered-Reflection method (CRM). CRM was firstly employed to solve best approximation problems involving affine subspaces. In this setting, it was shown to outperform the most prestigious projection based schemes, namely, the Douglas-Rachford method (DRM) and the method of alternating projections (MAP). We now prove convergence of CRM for finding a point in the intersection of a finite number of closed convex sets. This striking result is derived under a suitable product space reformulation in which a point in the intersection of a closed convex set with an affine subspace is sought. It turns out that CRM skillfully tackles the reformulated problem. We also show that for a point in the affine set the CRM iteration is always closer to the solution set than both the MAP and DRM iterations. Our theoretical results and numerical experiments, showing outstanding performance, establish CRM as a powerful tool for solving general convex feasibility problems.

This is a joint work with Roger Behling (EMAP/FGV) and Yunier Bello-Cruz (Northern Illinois University).

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