On the Tikhonov and proximal point regularization methods for pseudomonotone equilibrium problems

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Abstract: Equilibria is a recent research direction in applied mathematics. Equilibria can be considered as a further development from optimization and variational inequality. Equilibrium problems defined by the Nikaido-Isoda-Ky Fan inequality contains some important classes of optimization problems, variational inequalities, the Kakutani fixed point, Nash-equilibria and others as special cases.

We extend the Tikhonov and proximal point regularization methods to pseudomonotone equilibrium problems. For this case the regularized problem may not have a unique solution, even the solution set may not be convex. However, we show that any Tikhonov trajectory converges to the same limit point which is the unique solution of a bilevel convex programming problem. We propose a strongly convergent algorithm for approximating the limit point thereby showing that the bilevel optimization can be used as a tool for handling ill-posed pseudomonotone equilibrium problems.

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