Cutting surface methods for equilibria

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Abstract. The abstract equilibrium problem (EP) provides a rather general setting which includes several mathematical models such as optimization, variational inequalities, fixed point and complementarity problems, Nash equilibria in noncooperative games. It is well known that a pseudomonotone EP is equivalent to minimize the so-called Minty gap function. Though it is a convex function, it can be difficult to evaluate since this requires to solve nonconvex optimization problems. The aim of this talk is to present cutting type methods for solving EP via the Minty gap function, relying on lower convex approximations which are easier to compute. These methods actually amount to solving a sequence of convex optimization problem, whose feasible region is refined by nonlinear convex cuts at each iteration. Convergence is proved under suitable monotonicity or concavity assumptions. The results of preliminary numerical tests on Nash equilibrium problems with quadratic payoffs, other linear EPs and variational inequalities are also reported.

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