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Solving Cournot equilibriums with variational inequalities algorithms

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Abstract-

Over the past two decades, the fact that many games have been formulated as variational inequalities problems has led to relevant developments related with the existence and uniqueness of equilibriums, and with their calculation methodologies. Based on this approach, this study applies sufficient conditions for Cournot equilibriums existence and uniqueness, proving that while existence holds, uniqueness cannot be proved in general. To find one of the existent equilibriums, this study also proposes a novel variational inequalities algorithm which is globally convergent and easy to implement. It iteratively computes searching directions of the equilibrium by generating hyper-planes that separate the equilibrium from the intermediate solutions obtained relaxing the original Cournot game. Unlike other related algorithms, the proposed algorithm does not require Jacobian matrixes evaluation, and the iterative relaxed games can easily be solved using convex and quadratic optimisation models. Numerical results show the operation and convergence of the algorithm.

Index Terms-

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