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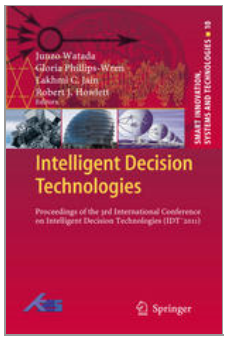
# Reduction of Dimension of the Upper Level Problem in a Bilevel Programming Model Part 2



## Abstract

The paper deals with a problem of reducing dimension of the upper level problem in a bilevel programming model. In order to diminish the number of variables governed by the leader at the upper level, we create the second follower supplied with the objective function coinciding with that of the leader and pass part of the uppser level variables to the lower level to be governed but the second follower. The lower level problem is also modified and becomes a Nash equilibrium problem solved by the original and the new followers. We look for conditions that guarantee that the modified and the original bilevel programming problems share at least one optimal solution.



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References (7)


1. Kalashnikov, V., Ríos-Mercado, R.: A natural gas cash-out problem: A bilevel programming framework and a penalty function method. Optimization and Engineering 7(4), 403–420 (2006) CrossRef
2. Kalashnikov, V., Pérez-Valdés, G., Tomasgard, A., Kalashnykova, N.: Natural gas cash-out problem: Bilevel stochastic optimization approach. European Journal of Operational Research 206(1), 18–33 (2010) CrossRef
3. Kinderlehrer, D., Stampacchia, G.: An Introduction to Variational Inequalities and Their Applications. Academic Press, New York (1980)
4. Mangasarian, O.: Uniqueness of solution in linear programming. Linear Algebra and Its Applications 25, 151–162 (1979) CrossRef
5. Rosen, J.: Existence and uniqueness of equilibrium points for concave *N*-person games. Econometrica 33(3), 520–534 (1965) CrossRef
6. Nishimura, R., Hayashi, S., Fukushima, M.: Robust Nash equilibria in *N*-person non-cooperative games: Uniqueness and reformulation. Pacific Journal of Optimization 5(2), 237–259 (2005)
7. Saharidis, G., Ierapetritou, M.: Resolution method for mixed integer bilevel linear problems based on decomposition technique. Journal of Global Optimization 44(1), 29–51 (2009) CrossRef


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