

Bilevel optimization with a multiobjective problem in the lower level

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Bilevel problems model instances with a hierarchical structure. Aiming at an efficient solution of a constrained multiobjective problem according with some pre-defined criterion, we reformulate this semivectorial bilevel optimization problem as a classic bilevel one. This reformulation intents to encompass all the objectives, so that the properly efficient solution set is recovered by means of a convenient weighted-sum scalarization approach. Inexact restoration strategies potentially take advantage of the structure of the problem under consideration, being employed as an alternative to the Karush-Kuhn-Tucker reformulation of the bilevel problem. Genuine multiobjective problems possess inequality constraints in their modeling, and these constraints generate theoretical and practical difficulties to our lower level problem. We handle these difficulties by means of a perturbation strategy, providing the convergence analysis, together with enlightening examples and illustrative numerical tests.