

Gadhi, N.; Hamdaoui, K.; El Idrissi, M.

Sufficient optimality conditions and duality results for a bilevel multiobjective optimization problem via a Ψ reformulation. (English) [Zbl 1433.90151](#)

[Optimization](#) 69, No. 4, 681-702 (2020).

Summary: In this paper, we are concerned with a bilevel multiobjective optimization problem (P). Using the function Ψ introduced by the first author and *S. Dempe* [*J. Optim. Theory Appl.* 155, No. 1, 100–114 (2012; [Zbl 1267.90130](#))], we reformulate (P) as a single level mathematical programming problem (P^*) and establish/exhibit the global equivalence between the two problems (P) and (P^*). Using a generalized convexity introduced by *J. Dutta* and *S. Chandra* [*Optimization* 53, No. 1, 77–94 (2004; [Zbl 1079.90104](#))], we derive sufficient optimality conditions for the problem (P) and establish Mond-Weir duality results. To illustrate the obtained results some examples are given.

MSC:

[90C29](#) Multi-objective and goal programming

[90C46](#) Optimality conditions and duality in mathematical programming

[49J52](#) Nonsmooth analysis

Keywords:

[bilevel programming](#); [convexificator](#); [duality](#); [efficient solution](#); [\$\Psi\$ -function](#)

Full Text: [DOI](#)

References:

- [1] Gadhi, N.; Dempe, S., Necessary optimality conditions and a new approach to multi-objective bilevel optimization problems, *J Optim Theory Appl*, 155, 100-114 (2012) · [Zbl 1267.90130](#)
- [2] Babahadda, H.; Gadhi, N., Necessary optimality conditions for bilevel optimization problems using convexificators, *J Global Optim*, 34, 535-549 (2006) · [Zbl 1090.49021](#)
- [3] Bard, JF., Optimality conditions for the bilevel programming problem, *Nav Res Logist Q*, 31, 13-26 (1984) · [Zbl 0537.90087](#)
- [4] Chuong, TD., Optimality conditions for nonsmooth multiobjective bilevel optimization problems, *Ann Oper Res* (2017)
- [5] Dempe, S.; Gadhi, N., Second order optimality conditions for bilevel set optimization problems, *J Global Optim*, 47, 233-245 (2010) · [Zbl 1190.90179](#)
- [6] Gadhi, N.; El idrissi, M., An equivalent one level optimization problem to a semivectorial bilevel problem, *Positivity*, 22, 261-274 (2017) · [Zbl 06861663](#)
- [7] Lafhim, L.; Gadhi, N.; Hamdaoui, K., Necessary optimality conditions for a bilevel multiobjective programming problem via a Ψ -reformulation, *Optimization*, 67, 1-11 (2018) · [Zbl 1427.90251](#)
- [8] Ye, JJ., Constraint qualification and KTT conditions for bilevel programming problems, *Oper Res*, 31, 211-824 (2006)
- [9] Demyanov, VF. Convexification and concavification of a positively homogeneous function by the same family of linear functions. Report 3, 208, 802, Universita di Pisa (1994).
- [10] Dutta, J.; Chandra, S., Convexificators, generalized convexity and optimality conditions, *J Optim Theory Appl*, 113, 41-65 (2002) · [Zbl 1172.90500](#)
- [11] Jeyakumar, V.; Luc, T., Nonsmooth calculus, minimality and monotonicity of convexificators, *J Optim Theory Appl*, 101, 599-621 (1999) · [Zbl 0956.90033](#)
- [12] Dutta, J.; Chandra, S., Convexificator, generalized convexity and vector optimization, *Optimization*, 53, 77-94 (2004) · [Zbl 1079.90104](#)
- [13] Hiriart-Urruty, JB., Tangent cones, generalized gradients and mathematical programming in Banach spaces, *Math Oper Res*, 4, 79-97 (1979) · [Zbl 0409.90086](#)
- [14] Ciligot-Travain, M., On Lagrange-Kuhn-Tucker multipliers for Pareto optimization problems, *Numer Funct Anal Optim*, 15, 689-693 (1994) · [Zbl 0831.49021](#)
- [15] Clarke, FC., *Optimization and nonsmooth analysis* (1983), New York: Wiley-Interscience, New York
- [16] Penot, M., A generalized derivatives for calm and stable functions, *Differ Integr Equ*, 5, 433-454 (1992) · [Zbl 0787.49007](#)
- [17] Mordukhovich, BS; Shao, Y., A non convex subdifferential calculus in Banach space, *J Convex Anal*, 2, 211-227 (1995)

- [18] Jeyakumar, V.; Luc, D.T., *Nonsmooth vector functions and continuous optimization* (2008), New York: Springer, New York · [Zbl 1138.90002](#)
- [19] Abadie, J. On the Kuhn-Tucker theorem. In: Abadie J, editor. *Nonlinear programming*. Amsterdam: North-Holland; 1967. p. 19-36.
- [20] Li, W., Abadie's constraint qualification, metric regularity, and error bounds for differentiable convex inequalities, *SIAM J Optim*, 7, 966-978 (1997) · [Zbl 0891.90132](#)
- [21] Li, W.; Nahak, C.; Singer, I., Constraint qualifications for semi-infinite systems of convex inequalities, *SIAM J Optim*, 11, 31-52 (2000) · [Zbl 0999.90045](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.