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Lagrangian Duality Algorithms for Finding a Global Optimal Solution to Mathematical Programs with Affine Equilibrium Constraints †

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Abstract: Mathematical programs with equilibrium constraints, shortly MPEC, are optimization problems with parametric variational inequality constraints.MPEC include bilevel convex programming problems, mathematical programs with complementarity constraints, Nash-Cournot oligopolistic market models, as well as optimization over the efficient set of an affine fractional multicriteria program as special cases. MPEC are difficult global optimization ones, since their feasible domains, in general, are not convex even not connected. In this paper we consider linear programs with affine equilibrium constraints. We use the Lagrangian duality to compute lower bounds for a decomposition branch-and-bound procedure that allows approximating a global optimal solution of problems in this class of MPEC. Application to optimization over the efficient set of a multicriteria affine fractional program is discussed.

Keywords: *Equilibrium constraints; bilevel convex program; optimization over the Pareto set; Nash-Cournot model; branch-and-bound; global optimum.*

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