

New algorithms for generating Pareto-optimal points of multi-objective optimization problems

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In this talk, we present a new algorithm for generating Pareto-optimal points of multi-objective optimization problems. One of the cornerstones of the algorithm is the way in which the joint decreasing directions of the objective functions are determined. In our case, we use a linear programming auxiliary problem to determine (one of) the joint decreasing directions. The LP auxiliary problem can be solved efficiently in polynomial time. Variants of our new algorithm were also developed for different classes of multi-objective optimization problems like unconstrained, problems with sign restricted variables, and problems with linear constraints.

For each problem class, for the sequence of points produced by our algorithm during the solution of multi-objective optimization problems we prove that if we have an accumulation point then it is a substationary point, as well. In addition, if we assume that the objective functions are convex, then the substationary point is also a Pareto-optimal solution to the problem.