Optimality conditions for linear copositive programming problems with isolated immobile indices

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Abstract: In the present paper, we apply our recent results on optimality for convex semi-infinite programming to a problem of linear copositive programming (LCP). We prove explicit optimality conditions that use concepts of immobile indices and their immobility orders and do not require the Slater constraint qualification to be satisfied. The only assumption that we impose here is that the set of immobile indices consists of isolated points and hence is finite. This assumption is weaker than the Slater condition; therefore, the optimality conditions obtained in

the paper are more general when compared with those usually used in LCP. We present an example of a problem in which the new optimality conditions allow one to test the optimality of a given feasible solution while the known optimality conditions fail to do this. Further, we use the immobile indices to construct a pair of regularized dual copositive problems and show that regardless of whether the Slater condition is satisfied or not, the duality gap between the optimal values of these problems is zero. An example of a problem is presented for which the standard strict duality fails, but the duality gap obtained by using the regularized dual problem vanishes.

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