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ON THE CONSTRUCTION OF REGULARIZING ALGORITHMS FOR THE CORRECTION OF IMPROPER CONVEX PROGRAMMING PROBLEMS

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We consider convex programming methods with a possibly inconsistent constraint system. Such problems constitute an important class of improper models of convex optimization and often arise in the mathematical modeling of real-life operations research statements. Since improper problems arise rather frequently, the theory and methods of their numerical approximation (correction) should be developed, which would allow to design objective procedures that resolve inconsistent constraints, turn an improper model into a family of feasible problems, and choose an optimal correction among them. In the present paper, an approximating problem is constructed by the variation of the right-hand sides of the constraints with respect to some vector norm. The type of the norm defines the form of a penalty function, and the minimization of the penalty function together with a stabilizing term is the core of each specific method of optimal correction of improper problems. The Euclidean norm implies the application of a quadratic penalty, whereas a piecewise linear (Chebyshev of octahedral) norm is concerned with the use of an exact penalty function. The proposed algorithms may also be interpreted as (Tikhonov) regularization methods for convex programming problems with inaccurate input information. Convergence conditions are formulated for the methods under consideration and convergence bounds are established.

Keywords: convex programming, improper problem, optimal correction, Tikhonov regularization method, penalty function methods.

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