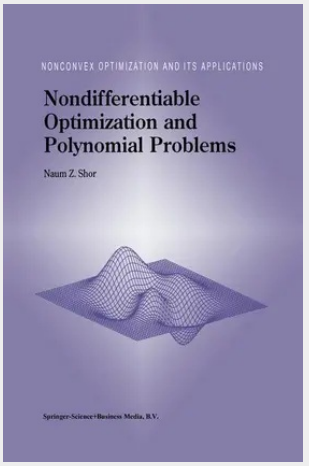
Shor

Nondifferentiable Optimization and Polynomial Problems



Polynomial extremal problems (PEP) constitute one of the most important subclasses of nonlinear programming models. Their distinctive feature is that an objective function and constraints can be expressed by polynomial functions in one or several variables. Let:e = {:e 1,.,:en} be the vector in n-dimensional real linear space Rn; n PO(:e), Pl (:e),., Pm (:e) are polynomial functions in R with real coefficients. In general, a PEP can be formulated in the following form: (0.1) find r = inf Po(:e) subject to constraints (0.2) Pi (:e) =0, i=l,. ,m (a constraint in the form of inequality can be written in the form of equality by introducing a new variable: for example, P(x) ~ 0 is equivalent to P(:e) + y2 = 0). Boolean and mixed polynomial problems can be written in usual form by adding for each boolean variable z the equality: Z2 - Z = O. Let a = {al,. ,a } be integer vector with nonnegative entries {a;}f=l. n Denote by R[a](:e) monomial in n variables of the form: n R[a](:e) = IT:ef';=1 d(a) = 2:7=1 ai is the total degree of monomial R[a]. Each polynomial in n variables can be written as sum of monomials with nonzero coefficients: P(:e) = L caR[a](:e), aEA{P) lX x Nondifferentiable optimization and polynomial problems where A(P) is the set of monomials contained in polynomial P.

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