Active Set Strategies and the
LP Dual Active Set Algorithm[1]

by

William W. Hager[2], Chun-Liang Shih[3], and Erik O. Lundin[4]

This paper is dedicated to R. T. Rockafellar on the occasion of his 60th birthday

Abstract

After a general treatment of primal and dual active set strategies, we present the Dual Active Set Algorithm for linear programming and prove its convergence. An efÆcientimplementation is developed using proximal point approximations. This implementation involves a primal/dual proximal iteration similar to one introduced by Rockafellar, and a new iteration based on optimization of a proximal vector parameter. This proximal parameter optimization problem is well conditioned, leading to rapid convergence of the conjugate gradient method, while the original proximal function is terribly conditioned, leading to almost undetectable convergence of the conjugate gradient method. Limits as a proximal scalar parameter tends to zero are evaluated. Intriguing numerical results are presented for Netlib test problems.

Key Words. Linear programming, quadratic programming, active sets, dual method, least squares, proximal point, extrapolation, conjugate gradients, successive over-relexation

AMS Subject ClassiÆcation. 90C05, 90C20, 65K05

August, 1996