

A DIRECT SEARCH MATHEMATICAL PROGRAMMING ALGORITHM

BY

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DATE DUE

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ABSTRACT

An improved direct search algorithm for the solution of nonlinear optimization problems is presented in this thesis. A pattern search employing the fast rotating coordinate method of Pappas is coupled with the reliable, direction finding procedure of the feasible direction method of Zoutendijk to obtain a combined algorithm that is both fast and reliable.

The new combined Direct-Feasible Directions Algorithm is applied to the optimal design of a power plant. The design study utilizes a relatively large number of synthesis runs in order to test reliability. This problem was previously treated by Pappas using his nonlinear programming algorithm, which a recent comparison study shows is among the best of those available, particularly with respect to reliability. The Direct Feasible Directions Algorithm was found to locate the optimum with complete reliability in this problem. The method of Pappas, on the other hand, was unreliable (19% failure rate) for certain values of the parameters studied. Thus, the expected improvement in reliability resulting by combining the procedures of Pappas and Zoutendijk is confirmed.

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