ISSN 1992-6502 (Print) ISSN 2225-2789 (Online)
Vol. 17, no. 6 (59), pp. 104-104, 2013. Vestnik UGATU http://journal.ugatu.ac.ru

UDC 004.7

INEXACT RESTORATION FOR NONLINEAR PROGRAMS

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Submitted 2013, July 9

Abstract. Inexact Restoration is a well-known technique for dealing with constrained nonlinear programs. Roughly speaking, each step of an Inexact Restoration algorithm can be divided into two basic parts. One is the restoration phase, where the feasibility of iterates is improved. This means that feasibility is treated here independently since it is often more important than optimality. Moreover, particular structures may be exploited better in this way. The second part of an Inexact Restoration step is an optimization phase in which a linearly constrained quadratic program has to be solved. An appropriate combination of both phases yields, under reasonable conditions, globally convergent algorithms.

Keywords: nonlinear programming; inexact restoration; line search; penalty function; complementarity constraints

Starting point for several recent developments in the area of Inexact Restoration algorithms were papers by Martinez [1] and Martinez and Pilotta [2]. We will show how their restoration principle and the global convergence analysis can be simplified. In particular, after the restoration phase, a new iterate is obtained by means of a single line search on an approximate tangent direction obtained from the quadratic program. Moreover, a stronger convergence result can be obtained. It can be shown that all step sizes remain bounded below and not only one but any accumulation point of this new IR principle satisfies the AGP (Approximate Gradient Projection) condition, a necessary optimality condition introduced in [3]. More importantly, a regularity condition that is usually needed in the restoration phase can be weakened so that the new Inexact Restoration algorithm can be successfully applied to a larger class of nonlinear programs. For details see [4].

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