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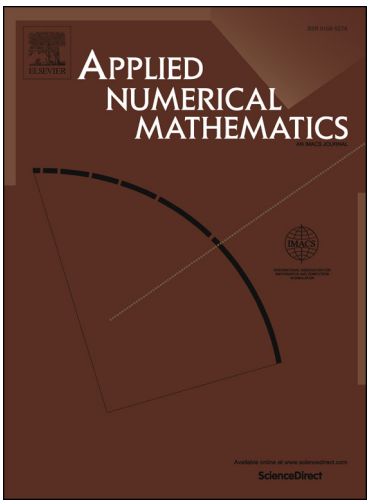

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An inexact Newton-like conditional gradient method for constrained nonlinear systems

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Abstract

In this paper, we propose an inexact Newton-like conditional gradient method for solving constrained systems of nonlinear equations. The local convergence of the new method as well as results on its rate are established by using a general majorant condition. Two applications of such condition are provided: one is for functions whose derivatives satisfy a Hölder-like condition and the other is for functions that satisfy a Smale condition, which includes a substantial class of analytic functions. Some preliminary numerical experiments illustrating the applicability of the proposed method are also presented.

Keywords: constrained nonlinear systems; inexact Newton-like method; conditional gradient method; local convergence.

1 Introduction

Let $\Omega \subset \mathbb{R}^n$ be an open set, and $F : \Omega \to \mathbb{R}^n$ be a continuously differentiable nonlinear function. Consider the following constrained system of nonlinear equations

$$F(x) = 0, \quad x \in C, \tag{1}$$

where $C \subset \Omega$ is a nonempty convex compact set. Constrained nonlinear systems such as (1) appear frequently in many important areas, for instance, engineering, chemistry and economy. Due to this fact, the numerical solutions of problem (1) have been the object of intense research in the last years and, consequently, different methods have been proposed in the literature. Many of them are combinations of Newton methods for solving the unconstrained systems with some strategies taking into account the constraint set. Strategies based on projections, trust region, active set and

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