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A FILLED FUNCTION METHOD WITH ONE PARAMETER FOR INEQUALITY CONSTRAINED GLOBAL OPTIMIZATION

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Abstract. In this paper, we consider global optimization problems with inequality constraints. We define a filled function for such problems. A new auxiliary function with one parameter is proposed, we prove that it is a filled function. Based on the filled function, a new algorithm is presented. By this algorithm, we can escape from a local minimizer to find a better one. Preliminary numerical results demonstrate the efficiency of this global method for inequality constrained global optimization.

Keywords. Local minimizer, global optimization, filled function method, nonlinear programming.

1. Introduction

In many real world optimization problems it is essential or desirable to find the global minimum of the objective function. over the past thirty years development of global optimization methods have attracted a lot of interest. Numerous algorithms have been studied and can be found in the surveys by Horst and Pardalos [18] and Levy Montalvo [13], Ge [8] as well as in the introductory textbook by Horst et al.[10]. These global optimization methods can be classified into two groups: stochastic(see.e.g.,[4], [20], [14], [12],[15]) and deterministic methods(see, e.g.,[1],[8],[10], [11], [19]). Stochastic methods employ random factors, for example points are chosen randomly. Thus every run of such an algorithm could yield a different result. However, results obtained by a deterministic method are always reproducible. In this paper, we focus on filled function method, which was proposed by Ge in [8].

In [8], the following global optimization problem is considered

$$\min_{x\in X} f(x) \tag{1}$$