Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **16 (2009)** 241-252
 http://www.watam.org

A ONE-PARAMETER FILLED FUNCTION METHOD FOR FINDING A GLOBAL MINIMIZER OF NONSMOOTH PROBLEMS

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Abstract. In this paper, we present a modified version of Ge's filled function definition for finding a global minimizer of a nonsmooth function on a closed bounded set, and propose a one-parameter filled function. The proposed filled function overcomes the following two weaknesses that the optimization problem has only a finite number of local minimizers and it has parameters which are heavily restricted by the minimal radius of the S-basin of some local minimizers of the problem. Theoretical and numerical properties of the proposed filled function are investigated and corresponding solution algorithm is proposed. Numerical results obtained indicate the efficiency of the proposed new filled function method.

Keywords. Filled function, global optimization, nonsmooth optimization, generalized gradient, directional derivative.

AMS (MOS) subject classification: 90C56, 90C30.

1 Introduction

This paper considers the following nonsmooth global optimization problem:

$$(P) \qquad \min_{x \in \Omega} f(x) \tag{1.1}$$

where $f : \Omega \subset \mathbb{R}^n \to \mathbb{R}$ is Lipschitz continuous with constant L; Ω is a closed bounded set containing all global minimizers of $f(x)$ in its interior. It is assumed in this paper that the number of minimizers of (P) can be infinite, but the number of the different value of minimizer of (P) is finite.

Filled function method is one of the effective deterministic methods which was first proposed for smooth optimization by Ge R.[5]. The key idea is to leave from a local minimizer x_1^* to a lower minimizer of $f(x)$ with the filled function constructed at the local minimizer x_1^*, the above process is repeated until find a global minimizer. Later, many scholars have also done a lot of useful ways to improve this method, see [6,13,12,9,10]. Theoretical analyses and numerical experiments show that the filled function method is promising.