# A FILLED FUNCTION FOR SEEKING GLOBAL MINIMA

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**Abstract.** The Filled Function Method is concerned with finding the global minimum of multimodal and multidimensional functions. The filled functions reported in the literature are with the features that may affect the computability when applied to numerical optimization. This paper proposes a new filled function. This function needs only one parameter and includes neither exponential terms nor logarithmic terms. Furthermore, the lower bound of weight factor $a$ is usually smaller than that of one previous formulation. Therefore, the proposed new function has better computability than the traditional ones.
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## 1 Introduction

There is a growing interest in methods of global optimization applied to multimodal functions because very few practical problems can be modeled to be unimodal.

The study of global optimization was strongly stimulated by the publication of the two volumes named *Towards Global Optimization* ([3], [4]). The recent progress was described in [8] and [13]. This paper concentrates on one of the approaches, the *Filled Function Method* (FFM). Early studies on the FFM were reported in [5], [6], [9], and [10].

The FFM is an approach to find the global minimizer of a multimodal function $f$ on $R^n$, under the following assumptions:

1. $f$ is continuously differentiable;

2. $f$ has only a finite number of minimizers; and

3. $f(X) \rightarrow +\infty$ as $\| X \| \rightarrow +\infty$.

To introduce the concept of the FFM, let us define the following concepts:

**Definition 1.1** *A basin of $f(X)$ at an isolated minimizer $X_1$ is a connected domain $B_1$ which contains $X_1$ and in which starting from any point the steepest descent trajectory of $f(X)$ converges to $X_1$, but outside which the steepest descent trajectory of $f(X)$ does not converge to $X_1$.*