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Stronger convergent results of the generalized Newton method for the generalized absolute value equations*

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Abstract

In this paper, we further analyze the generalized Newton method for the generalized absolute value equations. Some new convergent conditions for the generalized Newton method are obtained, which are superior to those appeared in previously published works. Numerical experiments are given to demonstrate the effectiveness of the generalized Newton method.

Keywords: generalized Newton method; absolute value equations; convergence condition

AMS classification: 90C05, 90C30, 65F10

1 Introduction

Consider the system of the generalized absolute value equations (GAVE)

$$Ax + B|x| = b, \quad (1.1)$$

where $A, B \in \mathbb{R}^{n \times n}$, $b \in \mathbb{R}^n$ and $|\cdot|$ denotes the absolute value. The form of the GAVE (1.1) implies that B in (1.1) is a non-zero matrix (when $B = 0$, the GAVE reduces to the linear system). It follows that the GAVE (1.1) is non-linear and non-differentiable because of the existence of the non-linear and non-differentiable term $B|x|$ in (1.1).

The form of the GAVE (1.1) has been first introduced in [1] and investigated in a more general context in [2–4]. Nowadays, the GAVE (1.1) has been widely observed because

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