Accepted Manuscript

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PII: S0377-0427(17)30655-6
DOI: https://doi.org/10.1016/j.cam.2017.12.027
Reference: CAM 11446

To appear in: *Journal of Computational and Applied Mathematics*

Received date : 7 August 2017
Revised date : 15 November 2017

Please cite this article as: Y.-Y. Lian, C.-X. Li, S.-L. Wu, Stronger convergent results of the generalized Newton method for the generalized absolute value equations, *Journal of Computational and Applied Mathematics* (2018), https://doi.org/10.1016/j.cam.2017.12.027

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)

$$Ax + B|x| = b, \tag{1.1}$$

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

*This research was supported by NSFC (No.11301009), 17HASTIT012, Natural Science Foundations of Henan Province (No.15A110007) and Project of Young Core Instructor of Universities in Henan Province (No.2015GGJS-003)

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