

## The generalized Newton method for the absolute value matrix equation

Anane Nassima <sup>(1)</sup> and Achache Mohamed<sup>(2)</sup>

<sup>(1)</sup>*Fundamental and Numerical Mathematics Laboratory, Ferhat Abbas University, Setif1, Setif 19000  
e-mail: nasimaannan@gmail.com*

<sup>(2)</sup>*Fundamental and Numerical Mathematics Laboratory, Ferhat Abbas University, Setif1, Setif 19000  
e-mail: achache\_m@univ-setif.dz*

### Abstract

In this paper, we have investigated a class of the generalized absolute value matrix equations (GAVME)  $AX-B|X| = C$ .

where  $A, B, C$  are given matrices in  $\mathbb{R}^{n \times n}$  and  $X$  is the unknown matrix.

We have also derived weaker sufficient conditions for the unique solvability of the (GAVME). For its numerical solution, Picard's iterative method and a generalized Newton method are proposed. Furthermore, we have demonstrated, under suitable assumptions, the well-definedness of the proposed algorithms and their global linear convergence to the unique solution of the (GAVME). Finally, we present a diverse set of numerical results to illustrate the efficiency of our proposed approaches.

**Keywords:** Absolute value matrix equations, linear system, singular value, Picard's iterative method, generalized Newton method.

### References:

- [1] M. Achache, On the unique solvability and numerical study of absolute value equations. J. Numer. Anal. Approx. Theory, vol. 48 no. 2, 112 – 121(2019).
- [2] M. Achache, N. Anane. On unique solvability and Picard's iterative method for absolute value equations. Bulletin of the Transilvania University of Brasov. Vol 13(62),No.1 – (2020).
- [3] M. Achache and N. Hazzam. Solving absolute value equations via linear complementarity and interior-point methods. Journal of Nonlinear Functional Analysis. Article.ID 39 : 1 – 10 (2018).