

Transactions on Signal Processing

Decision Letter (T-SP-30823-2023)

From: gff@deec.uc.pt

To: jontallen@ieee.org

CC: jontallen@ieee.org, gff@deec.uc.pt

((RQ)) T-SP-30823-2023 - IEEE Transactions on Signal Processing – “Chaotic Convergence of Newton’s method”

Body: 19-Sep-2023

Author: Jont Allen,

Address: Univ. of Illinois at Urbana, room 3062, 306 N Wright St, Urbana, Illinois, United States, 61801

Paper: T-SP-30823-2023, “Chaotic Convergence of Newton’s method”

Dear Dr. Jont Allen,

I am writing to you concerning the above referenced manuscript, which you submitted to the IEEE Transactions on Signal Processing.

Based on the enclosed set of reviews, your manuscript requires a MAJOR REVISION (RQ). Please note that the reviewers were very clear pointing organization, formatting and typesetting issues. Please try to address them all before resubmitting your work.

Your revised manuscript must be submitted back to ScholarOne Manuscripts

<https://mc.manuscriptcentral.com/tsp-ieee> no later than 6 weeks from the date of this letter, together with a required point-by-point reply that explains how you addressed the reviewers’ comments. If we do not receive your revised manuscript within 6 weeks from the date of this letter, your manuscript will be considered withdrawn.

After you finish revising your manuscript, please log into your Author Center at

<https://mc.manuscriptcentral.com/tsp-ieee> to upload the new file(s) to your submission. You will find your manuscript title listed under “Manuscripts with Decisions.” Under “Actions,” click on “Create a Revision.”

When submitting your revised manuscript, upload required [response-to-reviewers.txt](#) file. You can upload this file in the section marked “Respond to the Decision Letter” or to the “File Upload” section. **It must be uploaded as a separate file from your manuscript file. Please do NOT upload it to the “cover letter” field as the AE/reviewers do not have access to that section.**

Please remember that the Associate Editor should only decide RQ (major revision) once during the peer review process of any paper. Subsequent decisions after one RQ should be AQ, A, or R only.

If you have any questions regarding the reviews, please contact me. Any other inquiries should be directed to Nanette Januszkiewicz.

NOTE - Open Access:

The Transactions on Signal Processing (TSP) is a hybrid journal, allowing either Traditional manuscript submission or Open Access (author-pays OA) manuscript submission.

The article processing charge (APC) for OA is USD \$2,345 with discounts available for SPS and IEEE members: SPS members will receive a 20% discount on their open access APC and those who are IEEE members, but not members of individual IEEE societies or councils, will receive a 5% discount on their open access APC. Discounts cannot be combined. If your manuscript is accepted, and you choose to make the article Open Access, you must agree to pay the open access APC. Other APCs for services such as for color-in-print, overlength, page charges, or ordering reprints, will be billed separately once the manuscript formatting is complete, but prior to the publication.

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NOTE - Overlength manuscripts:

The final submitted version of your manuscript may not exceed 16 pages in the double-column, single-spaced format including figures, photos, and bios.

If your paper is accepted, it will not be sent to production if it exceeds this limit. **I.E.: IF ACCEPTED, NO CHANCE TO MAKE CHANGES.** Additionally, any manuscript that exceeds 10 pages in double-column format will be charged mandatory overlength fees. The rate is \$220/page starting on page 11 of a published manuscript.

NOTE - Changes after Acceptance:

If your paper is accepted, your manuscript will be made available on IEEE Xplore within 3 weeks after receipt of the final materials.

Please note that the version of your manuscript that was ACCEPTED for publication will be the version posted for early access.

No changes will be allowed to be made to your accepted paper between when the "accept" decision is posted and you submit the final files.

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Best regards,

Prof. Gabriel Falcao (gff@deec.uc.pt)
Associate Editor
IEEE Transactions on Signal Processing

Nanette Januszkiewicz
Coordinator Society Publications
IEEE Signal Processing Society
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Reviewer Comments: **ALLEN'S RESPONSE WILL BE LIKE THIS**

Reviewer: 1

Recommendation: AQ - Publish With Minor, Required Changes

Comments:

(There are no comments. Please check to see if comments were included as a file attachment with this e-mail or as an attachment in your Author Center.)

Additional Questions: **THERE ARE 10 "COMMENTS, ALL SEEM POSITIVE, SO I DONT FEEL I NEED TO RESPOND TO THESE. I AGREE WITH R1'S "EXPLAIN:" AND FEEL HE/SHE TOTAL UNDERSTANDS THE CONTRIBUTION OF THE MS.**

1. Is the topic appropriate for publication in these transactions?: Adequate Match
1. Is the paper technically sound?: Yes
2. How would you rate the technical novelty of the paper?: Novel Enough for Publication

Explain: The paper investigates the behavior of Newton root-finding method and shows that it may illustrate chaotic behavior in the discretized version. Then the author proposes as a correction to modify the Newton method by adding a step size η with $|\eta| < 1$ and shows that under this modification the chaotic pattern seems to disappear. The author provided several examples to illustrate the concept. **ACCURATE SUMMARY.**

3. Is the contribution significant?: Moderately Significant
4. Is the coverage of the topic sufficiently comprehensive and balanced?: Treatment somewhat unbalanced, but not seriously so **PERHAPS MY REWRITE HAS DEALT WITH THE ISSUE. I FAILED TO CLEARLY DEFINE MY TERMS. IN THE REVISED MS I HAS FIXED THIS PROBLEM.**
5. Rate the Bibliography: Satisfactory
 1. How would you rate the overall organization of the paper?: Could be improved **I AGREE AND HAVE TRIED TO IMPROVE THE ORGANIZATION.**
 2. Are the title and abstract satisfactory?: No **I REDUCED THE ABSTRACT TO LESS THAN 300 WORDS.**
 3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes
 4. Are symbols, terms, and concepts adequately defined?: Yes **ACTUALLY THERE WERE MISSING DEFINITIONS, NOW THEY ARE FIXED.**
 5. How do you rate the English usage?: Satisfactory

If you are suggesting additional references they must be entered in the text box provided. All suggestions must include full bibliographic information plus a DOI. **I TRIED TO ADD DOI'S TO MY REFERENCES, BUT SO FAR BIBTEX IS NOT ACCEPTING MY CHANGES.**

Reviewer: 2

Recommendation: A - Publish Unaltered

I HAVE NEVER SEEN SUCH A POSITIVE REVIEW.

Comments:

The author is investing reducing the magnitude of the step size and changing its angle in Newton's method to stay away from the boundaries of the N sub-regions of ROC in order to converge to the root. The results are original, a great compliment for the well-know classical literature on the convergence of Newton's method. The abstract, introduction, motivation of the paper are extremely well explained.

Explanations on the step size and relationship with the poles are well explained in addition to the satisfactory examples.

Additional Questions:

1. Is the topic appropriate for publication in these transactions?: Excellent Match

1. Is the paper technically sound?: Yes **TYPO:**

2. How would you rate the technical novelty of the paper?: Novel Enough for Publication

Explain: Great results on the reducing the magnitude of the step size and changing its angle in Newton's method to stay away from the boundaries of the N sub regions of ROC in order to converge to the root.

3. Is the contribution significant?: Significant

4. Is the coverage of the topic sufficiently comprehensive and balanced?: Yes

5. Rate the Bibliography: Satisfactory

1. How would you rate the overall organization of the paper?: Satisfactory

2. Are the title and abstract satisfactory?: Yes

3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes

4. ? **TYPO**

5. How do you rate the English usage?: Satisfactory

6. If you are suggesting additional references they must be entered in the text box provided.

All suggestions must include full bibliographic information plus a DOI. **WILL DO.**

: N/A **TYPO?**

Reviewer: 3

Recommendation: RQ - Review Again After Major Changes Comments: This paper is unfortunately very poorly written first of all, with Abstract being in a format that I have never seen in TSP. I have also problems with the technical presentation and see my comments below for detailed comments.

R1 AND R1 SEEM POSITIVE. #3 IS very NEGATIVE, AND STATES THE MS IS "UNINTELLIGIBLE." I'M HAVING SOME DIFFICULTY DEALING WITH REVIEWER "VARIANCE." BELOW I'M TRYING TO PRECISELY DEAL WITH R3'S COMMENTS.

SOME ADVICE FROM THE ASSOCIATE EDITOR WOULD BE WELCOMED HERE.

MAJOR COMMENTS

1) The abstract is too long. I think this is not appropriate. **FIXED!** It is also quite hard to get to the point and understand the main contribution. **I DISCOVERED I FAILED TO DEFINE TWO KEY DEFINITIONS. I BELIEVE THIS MAY HAVE BEEN THE PROBLEM.** It is clear from title that the paper is about convergence of Newton's method, so it would be great if the abstract is to-the-point and short and telling us what is being developed here. **I TRIED TO FIX THIS.** I am also not sure about the typesetting, filenames in the draft. In Figure 1, it looks like at the end, author left notes for themselves (Fix label, add this or that) – this paper is a draft, not a ready, polished, submitted version. **NOTES TO MYSELF HAVE BEEN REMOVED. I HAVE TRIED TO POLISH MS FOR FINAL PUBLICATION.**

2) The author derives in Section I.A the complex Newton's method. The expression in I.3 is unclear as a definition of derivative. η appears as the step-size and as its limit goes to zero, it cannot appear on the LHS of (I.3). **FIXED.**

3) The author could do a better job introducing the complex Newton's method, as regular Newton's method in most of the literature is a second-order optimization method – for most of the readers of TSP. **I 100% AGREE.**

MY ERROR WAS NOT IN THE ORDER OF NEWTON'S APPROXIMATION, IT WAS IN THE ISSUE OF THE USE OF THE COMPLEX-ANALYTIC-FUNCTION.

SPECIFICALLY, WHY DOES NM BECOME NONLINEAR WHEN THE STEP-SIZE $S_n(s)$ IS COMPLEX ANALYTIC AND THUS LINEAR? WHAT THE MS SHOWS IS THAT IN THE LIMIT $\eta \rightarrow 0$, THE NL EFFECT “DISAPPEARS.” HOWEVER IT IS EVER-PRESENT. IN MY PRESENT VIEW, THIS IS THE CONTRIBUTION OF THE MS.

I BELIEVE I'M NOW DOING AN ADQUATE JOB OF EXPLAINING THIS VIEW.

4) There is no clear description of the problem being solved. Look at the figures! READ THE CAPTIONS THE MAIN POINT OF THE FIGURES IS THAT THE STARTING VALUE s_0 IS CRITICAL, AS STATED BY (GALÁNTAI, 2000) No clear theorems/propositions in a clear format, the paper is hard to read in this form. I DON'T PROVE THEOREMS. I WAS NEVER TAUGHT THIS SKILL.

Optimally a paper about convergence can be written in a more methodical way, highlighting the main result in the form of a new theorem or proposition. IF IT WERE WRITTEN THAT WAY I WOULDN'T READ IT. IT IS WRITTEN FOR AN ENGINEERING MIND-SET. CONVERGENCE IS A SIMPLE TOPIC.

5) An important part of the paper is on simple examples. Again, here the writing is very ad hoc, and not mathematically clear. My overall impression is that, the paper is on an interesting topic, but badly organized and unclear (apart from various typos and typesetting issues). AS YOU HAVE CLEARLY STATED, UNLIKE REVS 1, 2, I DON'T THINK YOU UNDERSTAND THE MS. My main suggestion is for the author to organize main findings in a theorem/proof style and make the mathematical definitions clearer. THAT IS NOT THE STYLE OF IEEE DOCUMENTS. IEEE IS NOT A MATH JOURNAL.

Additional Questions:

1. Is the topic appropriate for publication in these transactions?: Adequate Match

1. Is the paper technically sound?: No MY ADDITION OF TWO KEY DEFINITIONS SHOULD HAVE FIXED THE PROBLEM.

2. How would you rate the technical novelty of the paper?: Not Novel THIS VIEW IS IN CONFLICT WITH THOSE OF R1 AND R2.

Explain: Unfortunately, this paper did not seem intelligible. COMPARED WITH R1 AND R2, THIS SEEMS EXTREME! Please see my "Comments for author" below for explanations. MOST THE COMMENTS BELOW ARE A SINGLE NEGATIVE WORD. SOME DETAILS WOULD BE USEFUL. THE MS SUPPORTS (GALÁNTAI, 2000) SUGGESTION.

3. Is the contribution significant?: Not Significant

4. Is the coverage of the topic sufficiently comprehensive and balanced?:

Important Information is missing or superficially treated

5. Rate the Bibliography: Unsatisfactory

1. How would you rate the overall organization of the paper?: Poor

2. Are the title and abstract satisfactory?: No

3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes

4. Are symbols, terms, and concepts adequately defined?: No

5. How do you rate the English usage?: Satisfactory

If you are suggesting additional references they must be entered in the text box provided.

All suggestions must include full bibliographic information plus a DOI. : None

IN SHORT, UNLIKE R1 & R2, R3 STATES SHE/HE DOES NOT UNDERSTAND THE MS. MORE CONSTRUCTIVE COMMENTS WOULD BE VERY HELPFUL.

Date Sent: 19-Sep-2023

References

Galántai, A. (2000). The theory of Newton's method. *Journal of Computational and Applied Mathematics*, 124(1-2):25–44.