# Review of: "New adaptative numerical algorithm for solving partial integro-differential equations"

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Potential competing interests: No potential competing interests to declare.

**Report on the manuscript**

**New adaptative numerical algorithm for solving  partial integro-differential equations**

The paper addresses the numerical solution of parabolic partial integro-differential equations (PIDEs), which have practical applications in physics and engineering. This topic is relevant and important for researchers in these fields. The paper introduces an accurate numerical approach based on orthonormal Bernoulli polynomials for solving PIDEs. The use of operational matrices for these polynomials is a valuable contribution, as it allows for the transformation of the problem into a nonlinear algebraic system. This novel approach distinguishes the paper from existing methods and provides a fresh perspective on solving PIDEs. The inclusion of a convergence analysis in the paper is commendable. It demonstrates the rigor of the proposed numerical algorithm and provides insights into the stability and accuracy of the method. Justifying the convergence properties of the approach strengthens the credibility of the results. Also, the paper includes conducting experimental tests to examine the accuracy of the numerical algorithm. This is an essential step in validating the proposed technique. Additionally, comparing the proposed approach with other well-known methods in a comparative study adds value to the paper, as it allows for an assessment of the advantages and limitations of different methods for solving PIDEs.

The paper is well-structured and clearly presents the methodology, numerical algorithm, convergence analysis, experimental tests, and comparative study. This will aid readers in following the logical flow of ideas and understanding the contributions of the paper. Overall, the paper appears to present a valuable contribution to the field of numerical methods for solving PIDEs. By introducing an accurate numerical approach based on orthonormal Bernoulli polynomials, conducting convergence analysis, performing experimental tests, and comparing the proposed technique with existing methods, the paper demonstrates its potential significance and applicability.

**The paper needs minor revision and can be considered for publication in the journal after a revision is done. Below, I list some items to improve the quality of paper:**

1. I think the word “adaptative” in the title should be “adaptive”.
2. The introductory section should be amended to cover the main motivation of the work and the cons/pros of the method. Which gap the paper will fill in the literature. At the end of this section, an organization of the paper should be provided.

I suggest that the author use the following paragraph to be included in the introduction:

“The proposed paper presents a novel and accurate numerical approach based on orthonormal Bernoulli polynomials for solving parabolic partial integro-differential equations (PIDEs). This advancement in numerical methods holds significant relevance in physics and engineering, where PIDEs arise in various applications such as heat transfer and diffusion processes. By providing an improved tool for solving PIDEs, the paper offers practical benefits, including enhanced accuracy and computational efficiency. The inclusion of a convergence analysis and a comparative study with existing methods further strengthens the credibility of the proposed approach. The potential impact of this work extends to the improvement of modeling and understanding real-world systems, as well as inspiring further research and innovation in the field of numerical methods for PIDEs.”

2. The numerical solution of parabolic partial integro-differential equations (PIDEs) is of great significance in physics and engineering, where these equations arise in various applications. In this context, the paper introduces a novel and accurate numerical approach based on orthonormal Bernoulli polynomials [CITATION] for solving PIDEs. By utilizing operational matrices for these polynomials, the problem is transformed into a nonlinear algebraic system, enabling efficient computation. The proposed technique demonstrates good accuracy, as evidenced by convergence analysis and experimental tests [CITATION]. Furthermore, the paper conducts a comparative study with other well-known methods, highlighting the advantages of the proposed approach [CITATION]. This research contributes to the advancement of numerical methods for solving parabolic PIDEs and holds promising implications for improving the accuracy and efficiency of simulations in physics and engineering domains.

**I suggest that the author use the previous paragraph and the following citation should be used:**

1-*Axioms* 2023, *12*(2), 99; https://doi.org/10.3390/axioms12020099

2-Boundary Value Problems volume 2023, Article number: 108 (2023).

https://doi.org/10.1186/s13661-023-01796-1.

3. Contemporary Mathematics, Volume 4 Issue 1 (2023), 1-181. https://doi.org/10.37256/cm.4120232254.

2. The paper should discusses some limitations or assumptions made in the proposed approach. Additionally, providing insights into potential areas for future research and improvement can further enhance the impact of the paper.
3. The manuscript contains **several grammatical errors and typos**. I asked the authors to revise the manuscript using any tool.