Review of: "Analysis of the Spread of Covid-19 via Atangana-Baleanu Fractional Derivatives"

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Potential competing interests: No potential competing interests to declare.

I take this opportunity to thank the department for choosing me as one of the evaluators of the above-mentioned papers. I highly appreciate the authors' initiation and devotion to develop such research papers for the future generation of mathematics researchers. Overall, the paper is well organized and includes all the necessary components of journal papers. It is my pleasure to highly recommend the paper for approval by the concerned body. Herewith attached are my comments and suggestions for possible inclusion in the final draft of the paper.

Strengths of the paper.

1. Comprehensive analysis: The document provides a comprehensive analysis of the spread of Covid-19 using Atangana-Baleanu fractional derivatives. It covers mathematical analysis, model formulation, existence and uniqueness of solutions, stability properties, and numerical simulations.
2. Mathematical rigor: The document presents a rigorous mathematical treatment of the proposed fractional model. It discusses definitions, explanations, and properties of fractional calculus, demonstrating a solid mathematical foundation.
3. Novel approach: The use of Atangana-Baleanu fractional derivatives in modeling the spread of Covid-19 is a novel approach that offers distinct properties for capturing the dynamics of the epidemic. This adds to the existing body of knowledge and provides new insights into the behavior of the disease.
4. Practical implications: The document acknowledges the practical implications of the research findings. It discusses the potential for using the results to develop strategies for mitigating the spread of the epidemic, which can be valuable for policymakers and healthcare professionals.

Weaknesses of the paper

1. Limited context: The document does not provide an extensive contextual background of the Covid-19 epidemic. It briefly mentions the virus's emergence and transmission but does not delve into the broader epidemiological context or the specific challenges faced by different regions.
2. Lack of empirical data: While the document includes numerical simulations, it does not explicitly mention the availability or use of empirical data in developing the fractional model. The reliance on simulations without discussing the incorporation of real-world data may limit the practical applicability of the findings.

3. Limited discussion of limitations: The document does not extensively discuss the limitations of the proposed model or address potential challenges or uncertainties associated with its implementation. A more thorough exploration of the model's assumptions, constraints, and potential shortcomings would enhance the document's overall analysis.
4. Limited generalizability: The document focuses specifically on the Atangana-Baleanu Fractional Derivatives and their application to the Covid-19 epidemic. While this is a valuable contribution, it limits the generalizability of the findings to other contexts or diseases.

Overall, the paper demonstrates strengths in terms of its comprehensive analysis, mathematical rigor, and novel approach. However, it could benefit from providing more contextual information, addressing limitations, discussing the use of empirical data, and considering broader generalizability.