

Peer Review

Review of: "On the Fractional Dynamics of Kinks in sine-Gordon Models"

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This study explores the dynamics of single kinks, kink-anti-kink pairs, and bound states in the prototypical fractional Klein-Gordon example of the sine-Gordon equation. The authors modify the order β of the temporal derivative to that of a Caputo fractional type and find that, for $1 < \beta < 2$, this imposes a dissipative dynamical behavior on the coherent structures. They also examine the variation of a fractional Riesz order α on the spatial derivative.

The paper is interesting, but there are some comments:

1. What is the physical significance of the initial conditions described in equation (2)?
2. The authors should include a brief explanation of the Lorentz contraction factor.
3. The caption of Fig. 1 is overly long and should be shortened.
4. The detailed information could be more appropriately included in the main text.
5. In Fig. 1, the legend should be edited to describe the dashed curve.
6. In general, the captions of all figures are excessively long and require shortening.
7. The authors have chosen a very specific condition, as stated in equation (4). Could they clarify the rationale behind this choice?
8. The legend for the right-hand panel of Fig. 4 appears to be missing.
9. The solution presented for $\alpha = 2.01$ in the left panel of Fig. 5 shows a noticeable difference. Can the authors explain why?
10. The inclusion of a physical application would enhance the manuscript.
11. Some references cited are outdated. For instance, reference [17] from 1939 could be replaced with a more recent source.

Declarations

Potential competing interests: No potential competing interests to declare.